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Electrical Review

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Interference with Broadcasting

Legislation urgently needed

IT is now nearly two years since a Committee of the Institution of Electrical Engineers reported on means of minimising electrical interference with radio reception. This Committee, of which Dr. C. C. Paterson was chairman, could hardly have been of a more authoritative character, representing as it did all sections of the industry that were likely to be affected by its findings. Its members put in an immense amount of work during three years of investigations. Its recommendations received the unanimous approval of the I.E.E. Council.

There the work of the Institution, as a technical body, ended, and the recommendations were sent out to the appropriate Government Departments for necessary action. The rest is silence. No serious steps appear to have been taken in official quarters to implement the findings of this Report in its essential aspects. Yet it should not be difficult to do so, since listeners-in and users of electrical appliances tend more and more to become identical. To our mind the most important conclusion—that regulations should be made having statutory force—would cause fewer heartburnings than does most legislation.

Briefly, the position is that at the time of the publication of the Report the Post Office was dealing with over 40,000 cases of interference per annum. In only 5 per cent. of these was there any difficulty in getting the owners of the offending equipment to meet the expenditure required to install suppression devices.

The exceptions, however, may spoil reception over extensive areas, but that is not the worst harm they do. The very fact that recalcitrant individuals exist is itself enough to undermine the good spirit shown by the majority and make the system unworkable.

In order to bring defaulters into line the Committee has recommended that when a substantial number of broadcast receivers are adversely affected, the Electricity Commissioners shall be empowered to require the nuisance to be abated. Subject to the inclusion of reasonable provisions for appeal in special cases, in which the question of who is to bear the costs of improving the position would have to be taken into account, there seems little to object to in this.

In regard to new apparatus, the position ought to be easier, as usually the cost of including suppression devices during manufacture—and interference should, wherever possible, be suppressed at its source—represents a very small addition to the total cost.

Technically, there is no obstacle. An International Committee has laid down standard values to which interference should be reduced to become tolerable, and quite satisfactory methods of attaining these values are obtainable as a result of investigations carried out by the Electrical Research Association and the Post Office engineers. For particulars of the nature of the trouble and how it can be cured, we refer our readers to the article by Mr. G. W. Ingram in this issue.

Any real obstacles to the attainment of interference-free broadcasting are quite of another kind, but they need not exist if all electrical apparatus used in this country—wherever made—has to bear an appropriate mark indicating that it complies with all requirements in this respect. This is imperative, if the manufacturers who comply with the relevant British Standard Specifications are not to be penalised in the market in favour of those who do not, including, of course, foreign makers.

Maintenance of apparatus in proper condition to avoid the creation of intolerable interference might at first sight seem more difficult, but we believe the organisation developed by the Post Office is fully adequate to deal with this side of the question.

The introduction of unnecessary regulations would not, needless to say, receive support from us. In this case, however, we believe the need for them has been amply demonstrated, and nothing has happened since the publication of the Report to alter the opinion to that effect which we then expressed. Indeed, the need is greater now and will become more and more so.

The increase in output of our generating stations indicates an approximately corresponding increase in the amount of electrical apparatus—not all of British

manufacture—that is a potential source of interference. Any further delays will, therefore, add to the expenditure that must be incurred, as they did in the case of frequency standardisation.

The E.C.A. Conference

THE twelfth conference of the Electrical Contractors' Association, at Hastings last week, was a most enjoyable and successful affair. Thursday was perhaps a rather crowded day, but it was evident that the innovation of substituting five short papers for two long ones was justified. A wider range was covered and gave a greater number of speakers a choice, although their contributions were necessarily (and perhaps mercifully) limited. The "big guns" had their say, of course, but the rank and file were also well represented. The papers were eminently practical, although Mr. W. I. Jones also managed to get in a little psychology and philosophy—as well as providing a little humour—which Mr. A. G. Bruty, who comes from Dublin (although he insists that he is not Irish) also introduced. The President amused with a couple of true stories illustrating the doubtful advantages derived from a "house magazine." On the whole, we should say, business and pleasure were nicely balanced.

Lord Hirst's Views

LORD HIRST, the chairman of the General Electric Co., Ltd., who has been associated with the company since its inception in 1888, in mentioning at the annual meeting on Monday last that they were entering upon their fiftieth year, rightly said that the figures for the past year were a worthy result of fifty years' continuous endeavour. In referring to the prospects for the immediate future, he admitted that there was a temporary lull in industry, but he believes that this is due in part to overstocking, caused by the fear of shortage of raw materials which the armaments programme has aroused, and the impression he has gained in recent weeks is that "many of the shelves now require replenishing." In any case, his information is that our own industry, as well as many others, is doing better than in 1936, the last normal year. Such opinions, coming from one whose knowledge not only of the electrical industry but of industry in general is unquestioned, must prove heartening to those who have suffered from the lamentations of pessimistic prophets.

E.P.E.A. Membership

TIMES are changing in the electricity supply industry and the Electrical Power Engineers' Association realises that its members' positions are changing with them. Improved methods of generation and control and the closing down of power stations in favour of bulk supply are making the "commercial" side of ever-increasing importance. Accordingly the E.P.E.A. has decided to give such members direct representation on its National Executive Council and General Purposes Committee by appointing a member of the Sales Engineers' Sub-committee; Mr. W. E. Swale, of Birmingham, has been appointed. There was opposition to the proposal from members who asked why sales engineers should be treated differently from, for instance, meter and charge engineers. They were placated, however, by a decision to treat the matter as "experimental" for a period of twelve months. We consider that the Association would do well to consider favourably any measure likely to keep a hold on its commercial-engineer members.

A Distribution Suggestion

COMING from the head of a group of electricity supply undertakings which even before the McGowan Report was published had initiated its own scheme of co-ordination and consolidation, Sir Thomas Royden's remarks at the annual meeting of Edmundson's Electricity Corporation last week are of more than usual interest. It is the development of just such groups as this, with its facilities and resources for providing electricity over wide areas at uniform low prices, that the Government's long-awaited Distribution Bill must, it seems, inevitably aim at encouraging. The Edmundson group has attained its present enviable position without any form of coercion and it is to be hoped that the desirability and the possibility of similar voluntary amalgamations will not be overlooked in any future legislation. There is indeed a lot to be said for Sir Thomas's suggestion that, if the Government sees difficulties in the situation, the *status quo* of both municipal and company interests could be maintained for, say, not less than five years, somewhat on the lines of "Basis D" of the DeRenzi Committee. This would enable many of the interests concerned to work out voluntarily many of the problems which now confront them. The supply industry is becoming more and more restive and is being forced to postpone development schemes through uncertainty as to the future.

No Comments

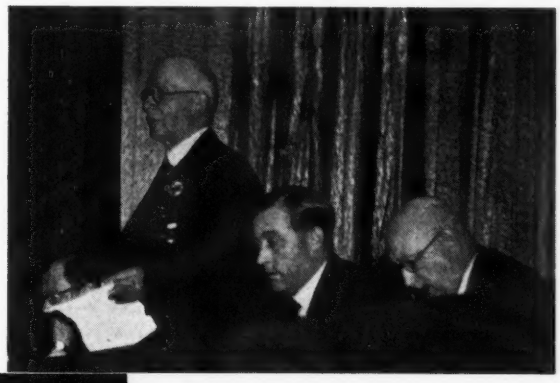
AN obstacle to the discussion of power station construction just now is the existence of so-called secret documents which are fairly widely circulated such as a recent A.R.P. memorandum. This is distributed among the staffs of electricity supply undertakings but is not available to the general public. In the term "general public" the A.R.P. Department seemingly includes other sections of the electrical industry more or less directly interested in power station design and also editors of the technical Press, who are not permitted to know, out of the myriads of items of information that come their way, what it may be undesirable to publish or comment upon in the national interest. The position is thus much the same (even if the reasons for really strict privacy are more valid) as it was in the notorious case of the "White Paper" on electricity distribution, about which the Press were similarly kept in (official) ignorance. As a minor example of the possible results of this attitude, we can take the case of the Report on Fire Risks at Generating Stations. This Report makes certain excellent recommendations, the adoption of which we should certainly advocate on technical grounds; yet it is obvious that certain of them will have to go by the board when anti-aircraft measures are the primary consideration. Nevertheless, the Fire Risks Report, which was actually issued after the memorandum to which we have referred, is all that the Press is supposed to know of official views on power station construction. Perhaps when the A.R.P. Department comes to know the electrical industry a little better, it will exercise the discretion of the older Departments that have been more closely associated with it over a long period of years.

The Cost of A.R.P.

A CONFERENCE of joint electricity authorities, joint advisory boards and joint committees has expressed the view that the proposed contribution from the Government of half the cost of protecting the works of supply undertakings against attacks by aircraft should be greatly increased. The total cost of schemes approved by the Electricity Commissioners, according to the *Financial Times*, is estimated at £3,000,000, of which the conference considers the Government should pay at least 90 per cent. It is surely not unreasonable to expect, for instance, that expenditure beyond that recommended in the recent Report of the Commissioners on "Fire Risks at Generating Stations" should be borne by the industry. Moreover, this Report set out what may be regarded as the best technical practice generally, quite apart from questions of national policy, and the intention was that such of the precautions should be adopted as might be "reasonably practicable in each case." Even where such work is necessary, however, there is all the difference in the world between the cost of carrying it out over a period as part of a general scheme of improvement and the cost of executing the work rapidly to meet a national emergency.

Electrical Contractors' Conference at Hastings

Members and guests totalling between four and five hundred attended the twelfth annual conference of the E.C.A. Allied Associations at Hastings last week when a full programme was carried through without a hitch, making the affair probably the most successful of the series



THE Council of the three bodies—the Electrical Contractors' Association, N.E.C.T.A., Ltd., and the National Federated Electrical Association—met at the White Rock Pavilion early on Wednesday last week and during the proceedings the President (Mr. H. E. Walker) was presented by Mr. W. R. Rawlings on behalf of the Council with a Zeiss camera.

During the day as more and more delegates issued from the headquarters, the Queen's Hotel, the conference badge became a commoner sight along the sea front, where the ordinary visitors were few for the time of year. The early comers made the most of their brief spell of freedom, for in the evening a very full programme was embarked upon which was to keep those who took the conference seriously pretty well engaged for the rest of their stay.

The evening function was the President's reception at the Queen's Hotel, when with Mrs. Walker by his side he went through an hour or so's handshaking ordeal which he survived very well, maintaining that *bonhomie* which helped to make the whole conference such a pleasant one. A dance followed which continued until about 11 o'clock, when a cabaret show by members of the "Fol-de-Rols" concert party was staged. There was some excellent dancing, the "high light" being an extremely effective display of fluorescence arranged by Mr. W. J. Jones and some of his E.L.M.A. colleagues. The party dispersed at midnight, by which time the rain which had set in had ceased.

The President and the Council pose for the "Review" photographer

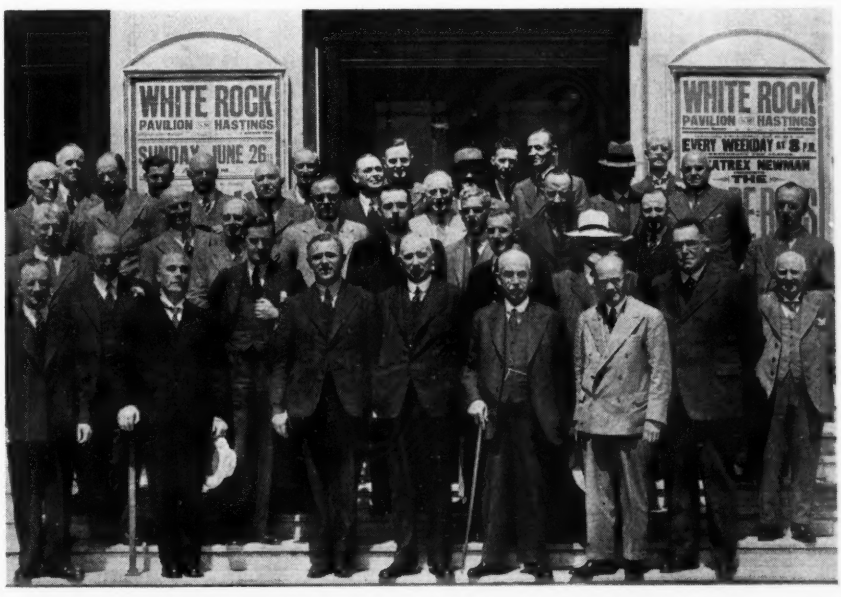
On Thursday morning the proceedings, according to custom and due no doubt to the preceding night's revels, commenced a trifle late, but the Mayor (Councillor E. M. Ford) was soon able to accord a civic welcome in a most able manner. He referred to the great benefits bestowed by electricity upon the modern world which had only been rendered possible by commercial service, which was the purpose of the conference.

Presidential Address

The President returned the thanks of the delegates for the Mayor's charming welcome, and then proceeded to deliver his address. In the course of this Mr. Walker said that the progress of the practical application of electricity had been phenomenal. To illustrate the advance which had been made he exhibited the first electric iron placed on the market by Col. Crompton towards the end of last century. Early progress was not very orderly and some endeavour had to be made to direct business on the right lines; the E.C.A. was one of the first efforts. They were all familiar with the history of the Association, but what of the immediate problems that beset them? Never before had there been so many vital questions affecting the future of the installation industry.

Above: Mr. H. E. Walker delivering his presidential address. Left: A part of his audience

He placed before them a number of questions which merited consideration. Would anyone, electricity being available at reasonable cost, adopt other forms of power, lighting and heating? Would the public demand or desire more than to be assured that the charge per unit was fair and reasonable in order to secure its adoption? Was the encouragement by the presentation of irons, kettles, &c., and the hire of apparatus at uneconomical rates likely to be of ultimate advantage? Should the cost of electricity be saddled with contributions to rates, costs of showrooms and installation departments? Would standardisation of manufactured goods be an advantage? What could be done to counter the granting of dis-



Mr. W. R. Rawlings presents a camera to the President on behalf of the Council

counts to those not entitled to them? Assuming that registration of employers and employed would be to the good, what further efforts could be made to attain it? What could be done to limit the waste of money and cost to the industry due to the time and trouble expended on preparing competitive tenders?

He spoke in strong terms of those so-called "electrical contractors" who ruined the constructive work of organised bodies, men who would refuse to adhere to, or would break, any commercial agreement for the purpose of scoring what they regarded as a "business success." From this resulted cut prices, the substitution of rubbishy for good things and the employment of untrained and unsatisfactory labour in installation work.

It was the aim of the Association to ensure that its members were technically competent and played the game. The alleged smallness of their membership (about two thousand) had been criticised, but the combined membership of the E.C.A. and its Scottish counterpart was much higher than that of the National Register which was a singular position when it was recalled that the Register was essentially an aid to business. He maintained that the two associations had enrolled all the really worth-while individuals and firms in the British installation trade.

After a reference to the Hire-Purchase Act which had been necessitated by the essential dishonesty of some types of trader, he condemned the unscrupulous house-to-house "high pressure" canvassing which seemed to call for similar action—this suggested consideration of the possible advantages to be obtained by Parliamentary representation.

He called upon members to support the Fair Trading Policy and to unite for the suppression of employers who refused to observe proper working conditions, and paid a tribute to those who worked for the Association year after year to safeguard the square deal and promote the welfare of the great contracting industry.

After the President's address Mr. E. E. SHARP made an eloquent appeal for the Association's aid in achieving his aim of raising £190,000 during his year of office as president of the Electrical Industries Benevolent Association. He pointed out to the members that it was *their* work he was doing, and it was essential that the funds of the E.I.B.A. should be put on a sound basis.

The applications being received for assistance were increasing at a greater rate than the revenue. There were only 5,000 small members when there should be 100,000. He suggested that trading concerns should give a tenth of a penny for each pound of capital and trading associations 1d. for each pound of wages paid. If he could get £10 from each E.C.A. member it would be a great help, and he asked them to persuade their staffs to join. He pointed out the benefits of a seven-year covenant to pay an annual amount which enabled the E.I.B.A. to recover a substantial amount of income-tax.

Holidays with Pay

After a break for refreshments the conference reassembled to hear Mr. A. G. BRUTY (Dublin) read his paper on "Holidays with Pay in the Electrical Industry—Two Years' Experience," which, with the other conference papers, was dealt with in our last week's issue. The discussion was opened by Mr. H. F. TRUMAN (Walsall), who thought that there was no reason for paying for bank holidays. His own firm gave wiremen a week's holiday with pay after five years' service—and saw that they took it by making them sign an agreement to do so. He maintained that casual labour could be avoided by proper organisation; one evil of the present system was that casual workers were led to set up on their own. He approved Mr. Bruty's scheme for deducting instalments from the men's pay to be handed over at the end of the year.

Mr. H. M. DRAKE (past-president) said that only by legislation could the principle of holidays with pay be made general. Unless it was, good contractors would be further penalised. He agreed that savings stamps and not money should be given until the end of the period and employers and employment exchanges should see that no employment was available to a man during his holiday period. With proper arrangement the output could be increased to counteract the increase in the wages bill. In one of his companies' factories the institution of two ten-minute breaks a day had actually increased output.

Mr. A. G. Bruty (Dublin) and his family

The President greets Mrs. Oakley and Mr. S. N. Watkins at his reception

Mr. E. A. REYNOLDS (Birmingham) suggested that until holidays with pay became compulsory it was a good idea to start a holiday fund to which the employer could contribute if he wished. In his own firm 2s. a week was deducted from each man's wages and paid into a fund so that when his holiday came round he had about £5 available.

Mr. W. H. LAMBERT (Bath) said that his firm had given the men holidays with pay for nineteen years and it was much appreciated. They had even paid for holidays during the last two years, although they had been unable to pay income-tax.

Mr. E. E. SHARP gave an account of his experiences as a manufacturer. His company had always given a minimum of one week's holiday with pay and had found it worth while. There was no reason why the factory people should be treated differently from the office staff. Believing in treating their workers well, they had instituted other

Personalities at the E.C.A. Conference, Hastings

1. Mr. A. J. Ryan (borough electrical engineer, Hastings) with Mrs. Ryan and Mr. J. Johnson Smith (London). 2. Mr. F. L. Humber (Manchester) and Mr. H. H. Berry with members of his family. 3. Mrs. J. F. C. Prosser (Birmingham) and Mr. and Mrs. J. G. Briggs (London). 4. Three members of Council: Messrs. F. Madge (Cardiff), P. Hewitt (Sheffield) and J. S. Shaw (Hull). 5. Mr. J. P. Loosemore (London), Mrs. F. C. Vine (London), Mrs. K. R. Mackley (Liverpool), Mrs. Loosemore and Mr. R. Chard (London). 6. Messrs. H. Jones (Liverpool), W. Riggs (London) and T. E. Alger (Newport). 7. Mr. and Mrs. F. J. Smith (Leicester). 8. Councillor and Mrs. W. A. King (Hastings) greet the President at the Mayor's reception. 9. Mr. and Mrs. H. M. Drake. 10. Mr. and Mrs. E. Peacop (West Bromwich). 11. Messrs. W. Riggs, H. J. Cash, W. H. Walton and W. Finlay (E.C.A. of Scotland). 12. Mr. and Mrs. E. E. Sharp.

concessions such as the five-day week. After the President had expressed his appreciation of the paper Mr. Bruty replied to the discussion. He pointed out that the battle for the principle was won; holidays with pay would not be a burden if everybody was on the same footing. He considered that casual labour was unavoidable in the contracting industry on account of the fluctuating volume of work. The proportion of wages in the industry was high in comparison with some others, and so holidays with pay meant a substantial increase in cost. He hoped, however, that the Association would do all it could to bring about legislation.

The Supply of Fittings

In presenting his paper on "How to Avoid Fittings and Apparatus being Excluded from the Contractor's Contract,"

Messrs. W. J. Jones and H. T. Young

Mr. W. CROSS (past-president) said that the question of discounts to shopfitters and decorative specialists was being considered by the Fair Trading Council.

The discussion was opened by Mr. J. F. VAZSON (Sheffield), who said that consultants and architects should not be given terms by manufacturers to pass on to clients. The matter was allied with registration; contractors should be tied down to fixed forms of precedure.

Mr. H. T. YOUNG (London) thought that the question was subject to a number of outside influences. The problem was to make a profit when fittings *were* included in the contract. Some contractors cut their profit on fittings while others received a hidden profit from the manufacturers. Having to maintain expensive showrooms he had been forced to take up the manufacture of fittings himself. Very often an architect preferred to wait until his building was erected and then choose fittings to harmonise with it. He referred to the adverse effect of inferior foreign fittings upon the manufacturers of sound British designs. He considered that the shopfitter and decorative specialist deserved credit for the work which they put in. The contractor's trouble was that his was primarily a section of the building industry and was therefore subject to certain long-standing practices which were not appropriate in his case and required attention.

Mr. E. A. PINTO (London) mentioned the increased number of prime cost items in specifications and said that this practice gave an opportunity to non-federated contractors. He maintained that municipal engineers were increasingly employing this system.

Mr. W. RIGGS (president-elect) said that the problem which formed the subject of the paper was the one which was really responsible for the formation of the Association, and many steps had been taken which tended towards a solution. In the early days the personality of a contractor counted a great deal; this had been lost sight of in recent years. If contractors would get on to a friendly footing with their customers many difficulties would be eliminated.

Mr. G. H. MILES (Brighton) made appreciative reference to the practice of one corporation which deducted the prime cost and provisional sum items from the total figure when comparing tenders. He complained of manufacturers going to surveyors behind the back of the contractor.

Mr. CROSS briefly replied to the points raised by speakers, and the conference adjourned for lunch.

Some Views on Advertising

Three papers formed the framework of the afternoon proceedings. Mr. W. I. Jones, whose paper on "The Technique and Morality of Advertising" contained a great deal of philosophy and quiet humour, was the first speaker.

Mr. J. WALSH (Blackburn) spoke amusingly as one who, as he said, had wasted much money in advertising but thoroughly believed in it. Referring to the author's statement that women were bored by reading and therefore knitted at the same time, he said he had heard that a woman knitted to occupy her mind while talking.

Mr. H. J. PEARCE (London), speaking as a manufacturer of electric signs, expressed surprise that the author had made no mention of this form of *electrical* advertising. It was such a popular method that he had no need to employ canvassers; the signs spoke for themselves. The only opposition came from architects, who resented the erection of signs on their buildings; but after all a commercial building was not an architect's monument.

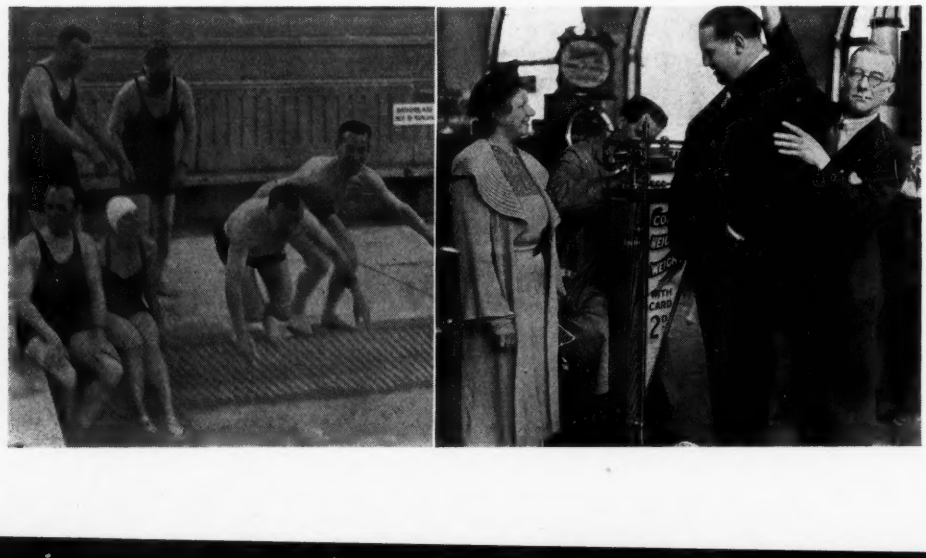
Mr. N. WALKER (Birmingham) thought that contractors had been inclined to neglect advertising. His firm had found their monthly house organ of great value in informing and educating customers. Direct and immediate results could not be expected from advertising; patience and persistence were essential. He asked the author what proportion of an electrical contractor's turnover should be expended for publicity purposes.

Mr. H. T. YOUNG (London) was enthusiastic in his praise of the paper. He had only one point of difference with the author: the methods adopted by modern advertising agents in the way of research suggested that advertising was a science as well as an art. He agreed that to draw attention to the danger of electric shock was an objectionable way of advertising. Goods were easier to sell than service and required a different method of approach.

Mr. A. E. ILIFFE (London) stressed the fact that service was the principal aim of the electrical industry, especially on the lighting side. He appealed to contractors to give manufactures the benefit of their experience. The timing of advertisements was most important to assist in smoothing out the manufacturers' load curve. He asked what the author considered to be the comparative value of Press advertising, technical advertising and direct mail approach.

The PRESIDENT said that his son (Mr. N. Walker) had referred to their firm's house organ, and gave an amusing account of some of the results. One friend of his stated that he had been so impressed by a recommendation of the electric blanket in the magazine that he had immediately obtained one from the electricity supply department.

In the course of his reply Mr. JONES said that he had found direct mail publicity of little use as a contractor in a small town. He preferred Press advertising, and mentioned the value of a recognised sign to distinguish an advertisement. He expected



Left: Mr. and Mrs. J. G. Briggs and Messrs. E. J. Davies, E. W. Marshall, M. Cantwell and S. B. Hopkins at the swimming pool. Right: Mr. K. R. Mackley "weighing in," assisted by Mrs. Mackley and Mr. R. T. Chatham

to begin to see results from continued advertising in about a month from the commencement. For a small contractor he thought that 1 per cent. of turnover was a suitable advertisement allocation.

The next item on the programme was the paper prepared by Mr. E. A. REYNOLDS (Birmingham) on "What Insurance is Desirable for Contractors and its Cost?" The discussion was opened by Mr. W. F. FURSE (Nottingham), who said that contractors should consider taking out a policy to cover claims for compensation for members of the staff receiving over £350 a year. He considered the paper to be a useful reminder, for

Some of the guests at Friday's garden party

some contractors did not realise how establishment charges were being increased by insurance.

Mr. J. F. VAZSON (Sheffield) said that many members had spent considerable sums in premiums for third-party insurance and had never made a claim. He suggested that the Association should go further in the matter of block policies for covering the whole of the membership. He reminded the conference that under the new Factory Act the contractor was equally responsible with the owner for accidents caused by defective apparatus and it was necessary to insure against this added risk.

Mr. L. C. PENWILL (Director and Secretary) emphasised the fact that third-party claims could be based only on negligence, which had to be proved by the claimant. Insurance companies would only cover insurers against common law liabilities; accidental damage was not covered. Mention had been made of the Association's fire insurance policy, and he suggested that members should make sure of the extent of their cover. He urged the necessity of immediate notification when a claim was contemplated, as delay often entitled the company to repudiate liability. The proposals for a policy should be examined very closely as they formed the basis of the subsequent contract. Another point mentioned by the speaker was that a claim could arise out of a contractor's negligence as much as twenty years after the completion of a job.

Mr. Penwill samples the strawberries at the garden party

Replying to the discussion, Mr. REYNOLDS mentioned that an insurance company would not pay out in respect of damage caused to customers' plant on which a contractor was actually working, although plant outside the job was covered. He expected that companies would shortly be putting up proposals for protection under the Factory Act, and backed up Mr. Penwill's advice to members to scrutinise their policies very closely.

The "Review" in evidence at Hastings

Technique of Discharge Lighting

In presenting his paper on "The Application of the Electric Discharge Lamp to Interior Lighting," Mr. W. J. JONES (manager of the E.L.M.A. Lighting Service Bureau), with the assistance of Mr. E. B. SAWYER (E.L.M.A.), gave a number of interesting demonstrations. He showed the effects of ultra-violet radiation on a number of fluorescent materials and exhibited examples of combined mercury discharge and tungsten filament lamps in spherical fittings. The application of this was exemplified by a two-part shop window in which the combined lighting was compared with illumination by filament lamps alone.

A number of speakers, headed by Mr. H. LONG (Birmingham), who said that discharge lighting had much greater merits than the merely economic ones, testified to the virtues of the new media of illumination. Lack of time prevented Mr. JONES from replying at length, but he again stressed the desirability of taking advantage of the greater efficiency of discharge lamps to improve the standard of illumination rather than to obtain the same amount of light at a lower cost.

The reception of delegates by the Mayor and Mayoress of Hastings at the White Rock Pavilion in the evening was invested with much civic dignity, which was greatly appreciated, as was the Corporation's lavish hospitality. Dancing continued until after midnight.

Closing Session

After the annual general meeting on Friday morning the conference again assembled at the White Rock Pavilion, when Mr. Walker announced the election of Mr. W. RIGGS, who has already occupied the chair, as his successor in office. Mr. Riggs was decorated with the President's badge (a very handsome piece of jewellery) and gave a short address. He said that he had a full realisation of the responsibilities of the office, and reiterated Mr. Walker's appeal for the enthusiastic support of the whole membership as the only means of achieving success.

There were three principal aims—fair trading, improvement of working conditions and, as a major issue, the compulsory registration of contractors and operatives. It might sometimes be thought that the Association's headquarters moved slowly, but he asked members to realise the volume of work with which they had to deal and the need for a thorough study from all angles of each matter brought up for consideration before a decision could be reached.

Bringing the session to a close, Mr. WALKER, who now resumed the badge of office, expressed the sincere appreciation of the Associations to the Mayor, Corporation and officials of

A Visit to the N.P.L.

Some Outstanding Activities.

THE annual inspection by the General Board of the National Physical Laboratory at Teddington took place on June 28th. About 1,500 visitors had accepted invitations and were received in the High-voltage Laboratory by Sir William Bragg, President of the Royal Society and chairman of the Board, Lord Rayleigh, chairman of the Executive Committee, and Dr. W. L. Bragg, director of the N.P.L.

Exhibits illustrative of the work done in the numerous sections of the Laboratory included a new portable instrument in the Electricity Department which has been devised for measuring the conductivity of dry-cleaning solvents to which soap is added in order to lessen the risk of explosion by sparking resulting from the generation of static electricity. The meter consists essentially of a thermionic valve with a milliammeter in the anode circuit and an appropriately calibrated dial. When the liquid to be tested is poured into the cell it forms a leakage path between the anode and grid of the valve, the conductivity of the liquid determining the anode current.

Capacitance and Power Factor Measurement

The equipment for determining capacitance and power factor has been redesigned to satisfy the more exacting requirements of the communications industry. A new a.c. bridge circuit has been developed for use with the fundamental N.P.L. standards of mutual inductance, resistance and phase angle. A completely screened variable sub-standard mutual inductance, incorporating a compensating circuit which ensures perfect quadrature of secondary e.m.f. and primary current, forms an essential part of the apparatus. The remainder of the circuit is built up inside an earthed screen with separately screened components, one of which, a resistance box, forms the link with the standards of resistance and phase angle. The properties of the condenser under test are related directly to those of the variable mutual inductance and the resistance box, which can be determined with great precision and are of high permanence. The equipment is designed for measurements on capacitances ranging from 500 $\mu\mu$F to 4 μF at frequencies up to 2,000 cycles, and the limits of error at 1,000 cycles are of the order of ± 3 parts in 10^5 on capacitance and $\pm 3 \times 10^{-5}$ on power factor.

Much work has been done on the correction of rectifier photocells for colour sensitivity and for departure from the cosine law in the case of obliquely incident light. A certain degree of improvement in the spectral sensitivity curve can be achieved by making suitable modifications in the process of manufacture, but to obtain even an approximate imitation of the sensitivity curve of the eye it is necessary to use a liquid colour filter. For special purposes a very small cell, with a sensitive surface of only 11.5 mm. diameter, has been constructed. It has a sensitivity of about 0.3 to 0.5 μA per foot-candle, as compared with the 1.5 to 4 μA usual for ordinary commercial cells of about 40 mm. diameter.

For obtaining information about the upper atmosphere a short wave radio transmitter has been made in the Radio Department for the Meteorological Office which can be sent up in a balloon and will automatically transmit information about changes of pressure and temperature continuously throughout its journey. The transmitter weighs only 4½ lb. and its dimensions are only 9 in. by 6 in. It transmits continuously on a wavelength of 8½ metres, with two separate audio-frequency modulations, the frequencies of which are controlled by pressure and temperature, changes of which are made to cause small changes in the air gap of tiny iron-cored inductances which provide the voltages required for modulation. An entirely automatic recording apparatus is in course of development.

When the flight is ended, by the bursting of the balloon, the transmitter comes down comparatively slowly with a parachute. Heights up to nine miles and distances of more than 100 miles have been reached, with good reception throughout, and in most cases the transmitter has been recovered.

For direction-finding services and, incidentally, for specifying the interference-producing radiation from motor cars and electrical machinery, it is necessary to be able to measure the field strength of ultra-short-wave radiation. In a supersonic-heterodyne receiver for this purpose the high-gain intermediate-frequency amplifier is made self-calibrating as to amplification by means of a method proposed by the radio branch of the Post Office. The random motion of the electrons in a high resistance, or in a parallel-tuned circuit, gives rise to minute e.m.f.s at the terminals of any such item, the effect being known as "the e.m.f. of thermal agitation." (It is colloquially known as "thermal noise" or "first circuit noise," because it manifests itself as a kind of frying noise in the telephones of a high-gain amplifier). The magnitude of the e.m.f. will usually be only a few millionths of a volt, but it is practically constant for a given resistance or tuned circuit. The gain of a sufficiently sensitive amplifier can therefore be set to a known and reproducible value by adjusting it until a definite measured output of voltage is given by the e.m.f. of thermal agitation in the first tuned circuit. The initial high sensitivity having been standardised in this way, any desired lower sensitivity is obtainable by means of calibrated attenuator or voltage-dividers incorporated in the amplifier, and thus what would otherwise be a wholly undesirable and limiting feature of a high-gain receiver is turned to valuable account.

A convenient method of calibrating such a receiver is to use a radiator consisting of circular tuned loop of copper tube. A distinctive feature recently introduced is the mounting of the radiator in such a way as to give a horizontally polarised radiation field. This expedient greatly simplifies the calculation of the effect of the earth.

The Radio Department has for many years made a special study of the somewhat elaborate technique of reception and amplification involved in the construction of cathode-ray direction-finding systems of this character, depending on the use of two directional aerials, the voltages induced in which are equal in phase and proportional respectively to the sine and cosine of the horizontal angle of arrival. The two separate amplifiers required must be identical in magnitude and phase, which calls for a special technique of construction and adjustment. A system of this kind, for use at wavelengths in the range 30-70 metres, has been constructed at the radio research station of the Laboratory at Slough. A visual indication of the bearing to within about 2 deg. can be obtained with field strengths of about 10 μV per metre, and bearings of somewhat lower accuracy are obtainable even with field strengths as low as 1 μV per metre It has been used, for example, for finding the bearing at Slough of aircraft flying between Cologne and London, by means of "pulse" transmissions on 50 metres sent out by the aircraft.

Metallurgy

The electrolytic method of preparing pure iron formerly employed at the laboratory failed to remove traces of certain elements, especially nickel. A chemical method of preparation has therefore been adopted and the melting of iron without contamination has been made possible by the use of the high-frequency furnace and the production of special refractory crucibles.

A combination of the Rosenhain plotting chronograph with an automatic potentiometer (the operation of the chronograph is controlled by a photoelectric cell when the galvanometer spot crosses the zero) provides a means for the completely automatic plotting of cooling curves over a wide range of temperature. Apparatus has also been designed in the Department for controlling the change of temperature of a furnace in such a way as to give a strictly linear change over a wide range in conjunction with the chronograph and potentiometer.

Electrical Contractors' Conference (*Continued from previous page*)

Hastings for their welcome and hospitality. He also thanked the authors of the papers and those who took part in the discussions, concluding with special gratitude to Mr. T. E. DICKINSON and his fellow members of the local branch for the arrangements made for the success of the conference. Mr. E. S. NEW (London), on behalf of the visitors to the conference, returned thanks in a neat speech.

Garden Party

The customary garden party took place in the afternoon in brilliant sunshine. It was held at Alexandra Park, and the attractions included the park itself, the Royal Artillery Mounted Band (dismounted on this occasion) and strawberries and cream, all of which combined to make a highly successful function.

In the evening a smoking concert was arranged at the Queen's Hotel, when a number of excellent artistes presented a bright programme. This was followed by a dance, which, although the third in quick succession, seemed to go with all the vigour of its predecessors.

While it is customary to say so, there is truth in the opinion expressed by many delegates that the Hastings conference was the best of the series of twelve E.C.A. conferences in many respects.

[All the photographs reproduced with these notes were taken by our staff photographer.]

Electrical Interference. By G. W. Ingram, B.Sc.

The types of interference, methods of propagation and the most common sources of spurious currents are stated and some practical means of suppression, as applied at the source or at the communication receiver, are given

THE problem of interference with communication systems has become acute in recent years, for the reasons that the overall gain or amplification used in telephone repeaters, radio receivers and like apparatus has increased enormously, and that electrical equipment of all types becomes more widely used every day. That is to say, the potential production of interference is rising along with the possibilities of reception and consequent annoyance value.

In the following notes, in order to simplify matters and to deal with the widest application, radio receiving apparatus will be taken as that which suffers most disturbance from the propagation of interference, serving as an interference detector for technical purposes. Another feature of the problem at the present time is the extent of the radio spectrum used for transmission and reception, namely, from 5 metres to 2,000 metres for radio telephone broadcasting or television.

Classification of Interference

Interference may be defined as any noise heard in the receiver which is not part of the desired signal and/or does not originate from the transmitting station. The chief types are as follows:

(a) Atmospherics due to electromagnetic or electrostatic storms. In these storms true atmospherics in intolerable quantities are so rare as to be of little importance, as far as the reception of broadcasting with a reasonably sensitive receiver is concerned. In any case, nothing can be done to eliminate such disturbances for reasons which will become apparent later, since any filtering or other circuits introduced to suppress the unwanted currents will suppress or seriously attenuate the desired signal. Many such devices have been tried, but success has been negligible and other more complicated arrangements and changes of wavelength have had to be used.

(b) Internal interference due to receiver faults in design or operation. The remedy here is obvious.

(c) Station overlap where two transmitting stations are operated with insufficient separation between wavelengths. Here again the solution is readjustment of the two transmitters and is not a problem of interference suppression.

(d) Interference due to electrical equipment is by far the most important type from the viewpoints that its production and propagation are preventable and/or remediable by comparatively simple methods.

Practically, every machine or appliance electrically operated is a potential source of interference setting up serious and widespread disturbance, unless special precautions are taken

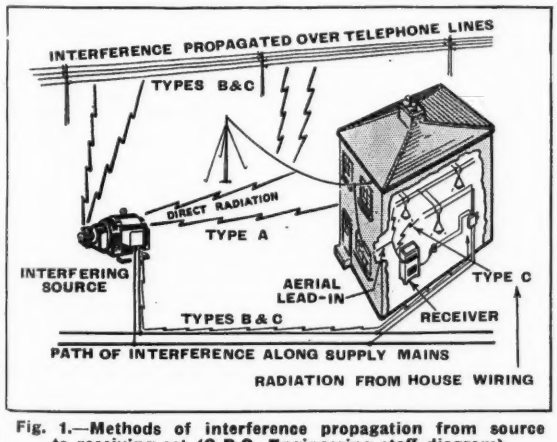


Fig. 1.—Methods of interference propagation from source to receiving set (G.P.O. Engineering staff diagram)

in the design stages. This applies whether the apparatus under review is in efficient mechanical and electrical condition or not, although generally more serious disturbance is usual with faulty or poorly maintained equipment.

The three main considerations are the design of electrical equipment, installation and maintenance, and addition of interference-suppression apparatus.

The design is a matter for the electrical manufacturer and, in view of possible legislation, modification of final designs will probably ensue.

Installation and maintenance of electrical plant are the particular cares of the engineer in the field and it is safe to say, in the light of extensive experience, that interference with radio reception would be reduced by from 20 to 25 per cent. if these items received proper attention. In most cases installation is carefully carried out, but subsequent maintenance is sporadic and superficial. Factories in any industrial area will show appalling examples of shoddy wiring and dirty and badly maintained control gear and machines, the general attitude being that so long as a motor revolves nothing else matters. These comments are made to drive home the facts that loose connections, sparking commutators and faulty equipment radiate interference or inject parasitic currents into the supply mains.

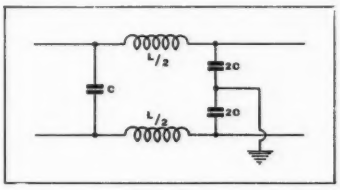


Fig. 2.—Schematic diagram of basic filter section

Suppression apparatus is added to electrical equipment to prevent the propagation of interference where no provision has been made in the design.

Methods of Propagation

The methods of interference propagation are not only indications as to the likely source, but serve as a guide to the particular suppression unit to be used and its location for maximum suppression efficiency, although this latter may be decided by the economic factor or simplification of application. Types of interference are classified as follows:

Type A.—Directly radiated interference is carried from the source by the ether of space, as in the case with the programme signal. The frequency spectrum covered may range from the lowest carrier frequency to the highest in the radio band, *i.e.*, from 3 to 20,000 metres in wavelength. The interference may be of any single frequency or may be a purality of periodicities and modulation products. Directly radiated interference enters the radio receiver through the aerial-earth circuit or is, more rarely, picked up on the receiver circuit wiring.

Type B.—Conducted interference. Variations in the magnetic and load conditions of a machine or inherent characteristic of apparatus connected to the supply network cause the production of harmonic currents which are injected into the supply line and conducted away from the machine over the whole or part of the system. This type of interference enters the radio receiver by the mains supply lead, and is rectified in the detector or power rectifier stages to be reproduced as a whirring, humming or buzzing noise. In this category will be found switching noises, motor noises and disturbance due to valve battery chargers, mercury rectifiers and ripple currents at low frequency from rotary convertors, balancers and d.c. generators.

Type C.—Reradiated interference. Since the harmonic currents producing interference are high-frequency in character at any periodicity or combination of periodicities over the whole radio-frequency spectrum, it is obvious that interference will only be conducted along the lines in a power system so long as this is the easiest path. But if any impedance is encountered during propagation, conduction ceases and radiation into the ether around the conductors takes place.

Curative Methods

Type C interference enters the radio receiver in exactly the same way as type A, but whereas it is only possible to effect a cure for type A by the use of screening at the source or special anti-interference aerial equipment at the receiver, type C may be remedied by simple filters installed at the terminals of the offending machine, or at the supply mains entry to the house where the receiver is installed, or at some point along the supply mains between the source and receiver. Consideration will show that, in effect, the house wiring becomes a transmitting aerial for interference currents and in semi-detached or terrace-type houses, the wiring in either house is sufficiently close to affect seriously the receiver next door. The investigations carried out by the G.P.O. and manufacturers of suppression apparatus give, over several million cases, the following ratios of the frequency of occurrence of the three types: A, 5 per cent.; B, 25 to 20 per cent., and C, 70-75 per cent.

As a concrete example of the conversion from type B to type C the following is given:—In a house where a modern receiver was in use reception normally was good and free from interference other than occasional switch clicks. It was found that when the electric wash boiler was switched on, after about

20 minutes a droning noise, completely marring any programme except that of the two local stations, arose. Tests showed that the increase in the boiler element resistance was sufficient to cause conversion from conducted interference to the reradiated type. A small condenser suppressor of commercial manufacture connected across the boiler supply terminals effected complete suppression.

The recognition of type can be made by tuning the receiver off any station. (The reason for this off-tuning qualification is that modern receivers incorporate automatic volume-control features which suppress all signals below a pre-determined level, and except on the weaker or more distant stations interference would not be heard.) Then, with interference tuned

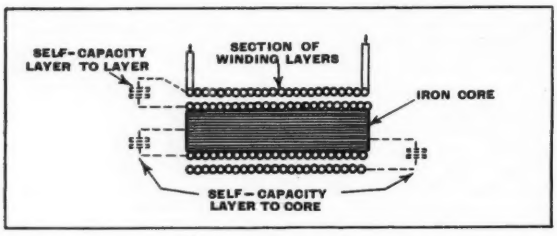


Fig. 3.—Showing how the high self-capacity of iron-cored chokes makes them ineffective

in at good volume, the aerial is disconnected at the receiver terminal or socket. If the noise now has disappeared or is greatly reduced in volume then the interference is of type A or C. If with the aerial removed the noise is still at the same volume then the interference is type B.

Suppression Apparatus

Suppression of electrical interference in communication circuits in the manner described is practicable at two points by the application of properly designed units, *viz.*, the source of interference and the receiver or communication system. The design of mains filters and the like for this purpose is regulated by British Standard Specification 613 in particular and in general by the I.E.E. Regulations where they apply.

The main considerations are voltage and current carrying capacities; safety of suppression apparatus and protection of associated equipment; safety of operating personnel; and appreciation in design of the high-frequency nature of interference currents.

For the separation of power-frequency currents from high-frequency interference currents of types B and C low-pass filters are interpolated in the power supply lines, either at the terminals of the generator, motor or other machine or at the

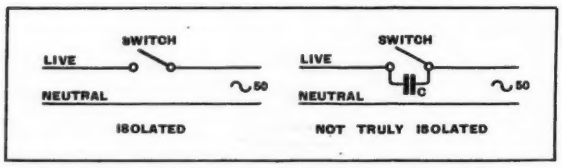


Fig. 4.—Effect of suppression condenser across switch

mains intake to the house where the receiver is, or again in the supply lead to the receiver.

When connected in the power circuit such filters will discriminate between the normal 50-cycle supply and the unwanted high-frequency harmonic currents, and while passing the former with negligible voltage drop or alteration will impose high impedance to the latter and prevent their propagation along the line, the condenser branch then providing an easy alternative path to earth for dissipation. Where the impedance of the source of interference is known to have a low high-frequency impedance due to low inductive reactance or high self capacity the condenser branch may be omitted as the source will serve as a by-pass arm of the circuit.

Series impedances for suppression purposes are radio frequency inductors whose inductances range from 100 to 20,000 micro-henrys. Such coils have to be wound in special forms allowing for the behaviour of currents at high frequencies and must be capable of carrying continuously the full-load power current of the circuit. Insulation and terminal spacings are determined by the working pressure.

The shunt arms are condensers rated to operate at or above the voltage between the power supply lines and care must be taken to consider the phase or star voltage to be used in polyphase systems. To protect the condensers and the power system, fuses are always fitted in series with condensers.

To achieve safety of apparatus and personnel the whole filter should be suitably housed and earthing precautions taken where necessary. Except for two or three special cases, resistances are not used in the make-up of suppression apparatus, because filters are designed to have the maximum impedance over the greatest possible frequency range by resonance of the inductances and capacitances in association, and the introduction of any resistance into the circuit would flatten the resonance curve and seriously reduce the efficiency of suppression of the filter.

Notes on Design

Since impedances are needed, it may be thought that the use of high-inductance iron-cored chokes would be more effective. Actually the reverse is the case, since the layer type of winding and the presence of a core lead to high self capacity, which has the effect, practically, of introducing a condenser into the circuit and by-passing the high frequency interference currents.

The capacity of condensers is an important point. In B.S.S. 613 the maximum capacities are laid down and the reasons for this are, first, that unless the condensers are small then current at power frequency will pass freely and result in wastage and heating of the condensers; second, that a condenser of 0.01 μF has a reactance of only 16 ohms at 1 megacycle (300 metres) is compared with a figure of 1,000 ohms at 50 cycles.

Considering these figures in their relation to the reactance of the series arms of the filter (fig. 2), say 13,000 ohms for a 2,000-μH inductor at 1 megacycle and 0.0031 ohm at 50 cycles, the functions of the filter become apparent.

Thirdly, if a condenser is connected in such a way that, even

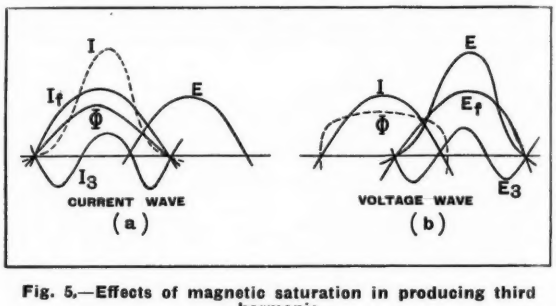


Fig. 5.—Effects of magnetic saturation in producing third harmonic

with a switch in the "off" position, the circuit is not truly isolated, then the capacity must be small to ensure complete safety to operators working on the circuit.

Interference by Electrical Plant

The normal operation of motor generators, convertors, mercury rectifiers, traction equipment and the inherent behaviour of long transmission lines produce harmonic currents having certain characteristics in common, in so far as, with polyphase a.c. at 50 cycles, the odd harmonics, and particularly those having 3n as a base, make up the interference current, in star-connected systems. A three-phase star-connected supply network simulates a system having a super-imposed single-phase high-frequency current between phases and between the three phase wires taken as one conductor and earth as the other.

An earthed neutral, therefore, is not at earth potential, but oscillates above and below zero by an amount depending upon

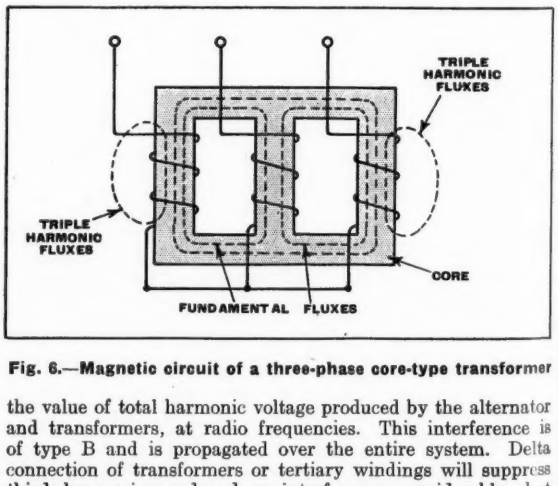


Fig. 6.—Magnetic circuit of a three-phase core-type transformer

the value of total harmonic voltage produced by the alternator and transformers, at radio frequencies. This interference is of type B and is propagated over the entire system. Delta connection of transformers or tertiary windings will suppress third harmonics and reduce interference considerably, but their use is not possible where power and lighting voltages are

required from the same system of conductors. Type C interference will also be produced in this way.

Variations of air gap and magnetic loading in motors, generators or transformers will alter power-frequency current and voltage wave shapes due to distortion and addition of high-harmonic components. It is, therefore, important to see that equipment is operated slightly below full load conditions or that the design is carefully considered.

Effect of Higher Harmonics

In fig. 4a the counter e.m.f. E, in each transformer phase is sinusoidal, and, therefore, the flux I inducing it is a sine wave leading E by 90 degrees, following the law of magnetic induc-

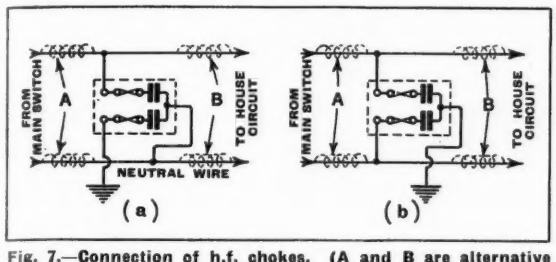


Fig. 7.—Connection of h.f. chokes. (A and B are alternative positions decided by tests, if chokes are required)

tion. When the core is saturated, the magnetising current, I, increases more rapidly than the flux as the curve becomes peaked, and can be separated into a fundamental I_f and a third harmonic I_3, the higher harmonics being also present. Hence in a saturated magnetic circuit the flux I varies with time as a flat-topped wave. The induced voltage E, at any instant, varies as dI/dt and is a peaked wave, containing E_f a fundamental and E_n, the aggregate of the 3n harmonics and higher values, which will give rise to the condition of "oscillating neutral."

With supersaturated cores the voltage harmonic may be 50 to 60 per cent. of the fundamental, which increases the strain on insulation and has an enormous disturbance field as types B or C interference. In both the voltage and current cases considered above the triple harmonics are in phase with the fundamental, but hysteresis causes unsymmetry of the magnetising current wave and a phase shift of the triple harmonic current occurs together with an addition of a fifth harmonic.

The foregoing conditions apply to a bank of three single-phase transformers or a shell-type unit, with the windings star-connected, but in the core type illustrated the triple harmonics of the fluxes do not exist and only the "non-triple" harmonics will be found in the end yokes; the triple-harmonic fluxes must find the high-reluctance air-leakage paths, and the resultant triple-harmonic voltages are small. The low reluctance paths are sometimes provided in three-phase core-type transformers by the addition of two outside core legs without windings and the triple-harmonic fluxes are dissipated in these.

Apart from the importance of triple-harmonic currents as far as communication interference is concerned (and here are included telephone and telegraph circuits), serious instability in operation of some types of protective relay occurs; for example, relays operating on unbalanced load may operate on perfect balance due to the presence of triple-harmonic current.

The fundamental voltages of induced e.m.f.s in a delta-connected transformer sum up to zero, *i.e.*, three voltages displaced in phase by 120 deg., and the three third harmonics of the flux and induced e.m.f. are all in phase with one another. Therefore, third-harmonic currents flow in the closed delta but oppose, in direction, the inducing triple-harmonic fluxes, thus weakening the latter; triple harmonics will not be injected into the supply lines, but will cause, in delta-connected motors or generators, additional copper loss.

High-voltage Lines

A loaded power transmission line has around it strong alternating magnetic and electrostatic fields in space. These induce in neighbouring communication circuits fundamental and harmonic voltages and currents which create serious interference or may even endanger the safety of apparatus or life. The research work of the American Telephone and Telegraph Company, the National Electric Light Association, and the Railroad Commission of the State of California in the United States and the work of the G.P.O., Electrical Research Association and manufacturers in this country are available in published form and should be studied in relation to such particular application.

It will suffice to say here that a system of "inductive co-ordination" between power transmission lines and communication circuits is essential if country-wide distribution of interference currents is to be avoided. The effective suppression of resonance or reflection on long lines is an allied problem and one which can only be solved by proper design, loading and installation of suppression equipment. Some of the factors affecting this problem are worthy of mention, and transient surges, switching conditions, line balance for capacitance, side to side and sides to earth, impedance balances, production of static due to wind-blown dust, corona due to surging or humidity, are all of importance. Transposition of power and communication circuits with a numerical difference in revolution interval will reduce induction of interference between the two circuits.

Methods of suppression adopted in practice are the interpolation of filters or the use of specially constructed anti-interference aerial equipments. There is, however, no such thing as a "standard" suppression unit. Differing applications requiring different treatment and many types of suppressor unit will be found in manufacturers' catalogues, each of which has one or more particular uses.

Certain special cases, such as those due to X-ray and medical electrical equipments, require special treatment and should be referred to a manufacturer specialising in this branch of the art.

Use of Condensers

Condenser suppressor units are extensively used on all types of electrical apparatus, both industrial and domestic. With a.c., the asymmetrical component of the interference current is taken care of by the connection of one condenser between neutral and earth, while a second condenser is a path for the symmetrical component between phase and neutral wires. Radio frequency inductors (choke suppressors) are used in series with the power supply lines, where the h.f. impedance of the source is sufficiently low to serve as a by-pass to interference currents. Inductors and condensers are used extensively in combination and may be simple filter sections or recurrent networks to cover a wider band of frequencies and give optimum suppression efficiency.

The simpler forms of suppression unit should be tried first

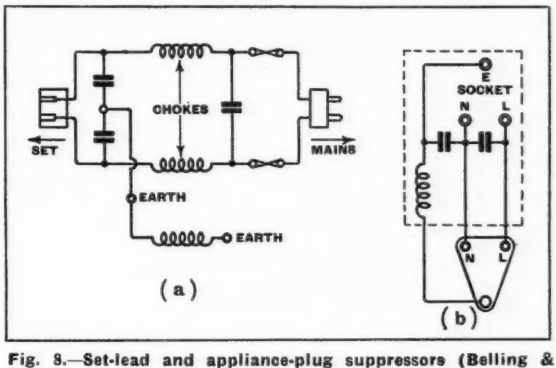


Fig. 8.—Set-lead and appliance-plug suppressors (Belling & Lee)

and the golden rule is to connect into the circuit with the shortest possible leads and as close up to the terminals of the offending apparatus as possible. Unless the plurality of offending sources is so great that, economically, suppression at these points is impossible, the greater relief from interference to the largest number of sufferers will be effected in this way, rather than by addition of suppressors at the receiver, which benefits only one person and is generally more expensive.

Expert Advice

If in any doubt as to the type of suppressor most suited to any case, consult a firm of reputable suppression engineers, whose technical staff has the necessary experience and apparatus to solve problems of this nature. Suppression apparatus to be efficient must be selected and installed with the same amount of care as would be taken in choosing a transformer, motor or switchgear and should not be considered loosely as a "wireless gadget." Use no suppression apparatus which does not conform with I.E.E. recommendations or B.S.S. 613, or which is not manufactured by a firm of repute.

DATA RELATING TO SUPPRESSION:—

Trolley-bus Interference—Electrical Research Association Reports—M/T29, M/T39, M/T13, M/T27, M/T30, M/T44-45.
B.S.S. 613/1935. General Safety Data.
I.E.E. Report—Electrical Interference with Broadcasting—1936.
British Standard Specifications. 505, 646, 727.
"Lightning"—Trans A.I.E.E. Vol. 49, pp. 857-948.
R. D. Evans and H.K. Sels—Transmission line circuit constants and resonance—Elec. Journal, Vol. 18, p. 306, 1921; also Transmission lines and transformers—Elec. Journal, Vol. 18, p. 356, 1921.
Publications of the G.P.O., B.B.C., Belling and Lee, Ltd., and other workers are available covering the subject at greater length or special applications.

The Great Hertfordshire Show

Prominent electrical exhibits

FINE and warm weather gave a festive atmosphere to the opening of the Great Hertfordshire Agricultural Show at Hatfield Park last week. Being the nearest County show to London it attracts a large attendance. By far the largest and most imposing exhibit was the North-Met stand. The company's area includes a large rural community, actually over 750 farms and horticultural premises and some 250 villages, which are supplied at ½d. per kWh on a two-part tariff.

Much of the equipment exhibited was then placed in various racks in a temperature-controlled shed heated by 3-kW elements and kept at approximately 80 deg. F. The maize is ready as fodder after only eight days. Another exhibit which drew considerable attention was the demonstration of liquid culture, a method of obtaining early flowers, fruit or vegetables. The seeds, which are kept in growing trays, are immersed in an electrically heated chemical solution which takes the place of soil. It is stated that unprepared dry bulbs placed in the tank on

The Northmet stand and personalities at the Great Hertfordshire Show: left to right—Captain J. M. Donaldson and Mr. H. W. Gregory on the "Northmet" stand; Mr. V. W. Dale (E.D.A.) absorbed in conversation; Brig.-Gen. R. F. Legge (chairman of the E.D.A. Council) examines a washing machine in the domestic appliance section; Lord Ashfield and Mr. Gregory interested in a bottle-washing machine *[Elec. Rev. photos.*

standard. For the dairy, working models showed how electricity can be employed for sterilising, cooling, milking and bottle filling and cleaning, while in the barn a portable electric motor can be employed for driving existing farm machinery, apart from the use of an electric mixer, root cutter, sheep shearers and clippers. Working models of electric pumps were shown, including small fountain units, while electric spraying plant, plant irradiators, soil sterilisers and automatic stokers, many of which were working, also found a place on the stand.

Of exceptional interest was the new sprout process which enables 150 lb. of green fodder per day to be obtained at any time of the year. The maize seed is soaked for a day and January 15th were in full flower six weeks later. Tomatoes also lend themselves particularly well to this treatment. For grading the tomatoes there was a special helical grader, the tomatoes rolling along a spiral track, the grooves of which progressively increase in size, enabling them to be separated automatically into boxes placed in front of the roller.

For the poultry farmer there were incubators, brooders, egg graders and egg washers, a poultry plucker and other poultry appliances, while for general use electrically operated hedge cutters, stunners, drills and battery chargers were shown. A novel type of vibrator shown takes the form of a box upon which the operator stands, the whole outfit vibrating at high frequency.

World Consumption of Base Metals

THE British Metal Corporation, Ltd., has issued a review of base metal conditions in which it gives the trend of consumption of copper, lead, and spelter in the chief countries of the world. This shows that the world consumption of copper in 1936 increased slightly as compared with 1935, the total being 1,857,000 tons. In 1937 there was a much larger increase, to 2,161,000 tons. The consumption of lead in the years 1935, 1936, and 1937 was 1,447,000, 1,559,000, and 1,704,000 tons, respectively, while the consumption of spelter increased from 1,355,000 in 1935 and 1,492,000 in 1936 to 1,581,000 tons in 1937. The figures represent the apparent consumption—that is, the volume of metal passing into the hands of consumers, not the tonnages actually used by them in manufacture. Actual consumption in 1937, nevertheless, was higher than ever before.

The bulk of the expansion in the demand for copper at least until the last few months of 1936, has been due to the revival in the electrical, building, and engineering trades of several countries. In the United Kingdom twice as much copper was used in 1937 as in 1929, and this mainly reflects the remarkable expansion of the electrical industry. Spelter consumption was only 9 per cent. higher than in 1929, while lead consumption shows an increase of 25 per cent.

World industry now shows signs of slowing down, and in several countries, particularly the United Kingdom, there are indications of declining demand. The growing prosperity of primary producing countries during 1936 and the first part of 1937 gave promise of increasing overseas demand for the manufactures of the industrial countries. Reviving international trade was expected to give new momentum to world economic recovery just when the internal demand for capital equipment in the manufacturing countries might begin to contract. Since April, 1937, however, primary commodity prices have fallen by nearly one-third, and they are now back to the level obtaining four years ago. The foreign balances of the primary producing countries are being rapidly exhausted, and their imports of manufactured goods must decrease after a time. Much depends, however, on the trend in the United States.

If trade recedes, the demand for durable goods will fall off faster than the demand for goods for current consumption. Falling activity in the constructional trades, however, will be partly arrested by Government schemes of public works in several countries. How far these will help the metals will depend, of course, on what the public works are—road-making would involve little or no demand for non-ferrous metals, but house-building and railway electrification would involve a big demand. The rearmament demand for the metals shows no signs of falling off.

International Engineering Congress

Different aspects of the electrical industry in Great Britain, the United States and France were dealt with in papers submitted at Glasgow last week, other subjects including an interesting survey of modern steelworks practice

THE four-day International Engineering Congress opened in the Conference Hall at the Empire Exhibition, Glasgow, on June 21st. The programme included visits to works, excursions, civic and social functions, with two groups of technical sessions on the first day and three on the second.

Among the numerous papers submitted was one in which Mr. S. B. Donkin (president of the Institution of Civil Engineers) reviewed technical and economic developments in heavy electrical engineering since the first similar Congress took place in Glasgow thirty-seven years ago. He mentioned that the promise of hydro-electric development in England had moved nearer fulfilment, but only comparatively recently. The growth of installed capacity in steam stations to 8,012,000 kW in 1936-37 would not have been possible without the steam turbine.

British Results

Each further improvement in efficiency demanded increased capital cost, and the fresh savings in running costs were rapidly being overtaken by the corresponding increase in capital charges. It seemed probable now that little additional reduction in the cost per kWh generated could be obtained without a radical alteration in the basic principle of the application of science to design—a change difficult to foresee at the present time.

One important effect of the construction of the grid had been to open the field to other forms of electrical generation as an alternative to the steam turbine driven plant, particularly to meet peak loads. Since 1922-3 the hydro-electric plant installed had increased from 8,000 kW, or 0.3 per cent. of all plant, to 294,000 kW, or 3.5 per cent., and there were further possibilities now worthy of investigation. Whatever else the grid had done, one of its most interesting contributions was psychological, in that it had attracted attention to electricity as a commodity.

Table I showed the increased utilisation, while Table II indicated the comparative outputs of fittings and appliances in units of £1,000.

TABLE I.

Class of consumer	1920-21		1936-37	
	Million units.	Per cent.	Million units.	Per cent.
Lighting and domestic ...	582	16.5	6,454	37.6
Public lighting	49	1.3	302	1.8
Traction	377	10.7	1,079	6.3
Industrial	2,504	71.5	9,312	54.3
Total	3,512	100.0	17,147	100.0

TABLE II.

Apparatus.	1924	1935	Percentage increase.
Electric lamps	2,485	3,347	35
Lighting fittings and accessories ...	1,616	3,198	98
Heating	357	1,530	328
Cooking	149	1,566	950

In recent years, whether for economic, political, or technical reasons, the rate of railway electrification all over the world had been intensified. During the three years from 1933 to 1936, electrification was completed for 4,400 route miles, in progress for 2,000 route miles and authorised for 5,000 route miles, a total of 12,000 miles. In the same period 84 miles were completed in Great Britain, 64 miles were under construction, and 350 miles were authorised, a total of 498 miles, or 4 per cent. of the corresponding world's total. At the end of 1937, in Great Britain, 612 miles were electrified, and a further 300 authorised, a total of 912 miles, or less than 5 per cent. of the total route miles of railways in the country.

The value of manufactured electrical machinery and apparatus of all classes, which in 1924 was nearly £63,000,000, had increased by nearly 45 per cent. in 1935 to a total of £91,000,000, made up as shown in Table III.

TABLE III.

	£ millions.	Per cent.
Generators, motors, transformers, convertors, and other heavy machinery	11.4	12.4
Switchgear...	8.0	8.8
Wires and cables	17.0	18.8
Wireless apparatus and valves	17.4	19.2
Other apparatus	37.2	40.8
Total	91.0	100.0

Great Britain employed 300,000 workers in the manufacture of electrical plant and apparatus of all kinds, and the industry was the fifth in importance. In 1935 Britain accounted for 31 per cent. of the total exports of generators, motors, &c., and 41 per cent. of the total exports of wires and cables from the six foremost exporting countries, among which it had taken first place in both categories for some years. The export of switchgear was nearly three times that of the other leading exporting country.

"Topping" in America

A paper by Mr. G. A. Orrok (New York) was entitled "The Central Station in One Man's Lifetime," being indicative of the general trend of design and performance in America. He mentioned Mr. E. N. Trump's proposal to wash the escaping boiler-flue gases, thereby transferring heat to the wash water which would be utilised in exhaust steam turbines.

This paper set out a number of reasons that were said to justify the selection of so-called "topping" plant (superimposed on older and lower-pressure installations), together with a discussion of the alternative of full expansion. The comparison indicated that the choice must be made with great care, but it was considered reasonable to anticipate that the higher the load factor and the higher the fuel price, the greater became the justification for "topping." There was no attempt to justify superposed plant on the ground of efficiency alone, but there might be economic advantage in rehabilitation by "topping," which was shown to have many subtle features.

The output of American central stations in 1937 reached 114,000 million kWh, at the rate of 10,835 B.th.u per kWh sent out.

Conditions in France

The rôle and evolution of the electrical industry in France and other countries were compared by Monsieur E. Mercier (president, Union d'Electricité). First, he showed statistically that the trend of consumption was similar in various countries and that none of his curves indicated any trend whatsoever toward saturation. Probable development would become equivalent to the electrical resources of entire continents, and so would result in intense activity in all branches of the industry.

Having considered the scale of the problem, the author proceeded to inquire into the influences of local, temporal and political circumstances. Electrical science and technique exhibited remarkable unity throughout the world. In the generation and distribution of electricity, however, there had been great diversity of organisation, while the transmission of energy and interconnection of systems were often confused, although they were quite distinct. Because of the difference, a hasty conclusion might be that the English State organisation was superior to the French system. The English high-voltage grid served solely for interconnection with the object of economising reserves; it provided but limited facilities of exchange, whereas there was considerable migration of energy over the French system. The differences between the ways in which the two systems were built up were mainly due to the influence of legislation.

The price of electricity could be reduced only by simplification and seeking for every rational method of standardisation. This was the reason for the tendency, which was fairly general, toward the regrouping of distributing organisations around the bigger units. This tendency was perfectly sound and had already produced appreciable results, particularly in France. It seemed impossible for many reasons to expect a reduction in future of the charges borne by distribution. In rural electrification France seemed to be the country which had made most progress.

M. Mercier's conclusions were that electrotechnics was, of all technical branches of industry, the most clearly international. The reason was that electricity was of recent origin and had developed simultaneously in countries of similar intellectual development. The needs of all peoples were the same, differing only in scale. But all countries did not reach the common stage of development at the same time. The causes of delays or accelerations were to be sought, not in personalities responsible for development, but in the legislation of the different countries.

In France, the very liberal system instituted by the legislature in 1906 gave entirely satisfactory results, and was still highly appreciated. It was important to note that this system had not resulted in a sale price higher than in countries where the freedom of the electrical industry was much more restricted. Despite this, the electrical industry in France was subjected, in 1935, to the severe but arbitrary intervention of the State in the matter of tariffs. This intervention, far from assisting development, actually slowed it down and produced

effects which are still being felt. It was curious that the intervention of the State at a short interval of time in two countries of fairly similar structure had produced such different results in England and France. The essential cause of this difference was that State intervention had been subjected to political influences much more in France than in England, a method which was not always the best way to solve economic problems.

Fuels and Shipping

A paper on the gas industry in Canada by Mr. J. Keillor attributed the decline in the sale of gas to cheap fuel and Diesel oil and electrical competition in the domestic and industrial markets. It referred to a recent Toronto experiment conducted by Mr. A. T. Stuart, director of the Gas Department of the Hydro-electric Power Commission of Ontario, which showed how complete gasification of coal, coke, &c., could be accomplished in a generator utilising oxygen produced from water by electrolysis, employing surplus electricity.

In dealing with the gas industry in Britain Sir David Milne-Watson admitted that so far as light and power were concerned electricity might well have the advantage, but not for heating. He estimated that of the total domestic demand for heat gas represented 19 per cent. and electricity 1.5 per cent., while eight million gas cookers were in use to-day among twelve million families, compared with 750,000 electric cookers. Sir David observed that the electrical industry, with the aid of a progressive tariff (which he almost called futurist) was competing fairly strongly with the gas industry for a share of the domestic heating load, but he considered it safe to assume that any wholesale adoption of domestic heating by electricity was unlikely.

In "Coal Consumption in Great Britain: a Review and Forecast," Sir Richard Redmayne mentioned how pithead prices had risen alarmingly in recent years. Much still remained to be done with colliery modernisation, for probably half the engine power in coal mines remained non-electric.

The best cure for low wages was said to be the production of more motive power. In this connection it was pointed out that since 1929, while the rest of the world had increased its production of electricity by 45 per cent., Great Britain's increase had amounted to 123 per cent.

How the harbour of Glasgow and the River Clyde had been improved was described by Mr. A. C. Gardner, president of the Institution of Engineers and Shipbuilders in Scotland. Electricity had largely replaced other forms of power throughout the quays and docks, and the repair and upkeep of the many cranes and other appliances employed were carried out in Clyde Trustees' new workshops at Renfrew, which were equipped with up-to-date machinery.

In a paper on shipbuilding in Italy, General G. Rota made brief reference to the present tendency to employ electric welding for all framework "not directly concerned in floating of the ship." In the case of ships of medium size the use of welding was being extended to the external shell plating.

Steel Works Practice

Some of the newer iron and steel works in Britain were described in a paper by Dr. A. McChance and Mr. T. W. Hand, who pointed out that at the Clyde Iron Works both electrostatic and disintegrator systems were to be used for cleaning blast furnace gas. The rolling mill section of the Clydebridge steel works had been still further improved by the recent starting up of a complete reversing electric drive for the slabbing mill, which served to "break down" the ingot to intermediate size suited to the plate rolling mill. With the conversion of this unit, the entire mill plant became motor driven and, by taking advantage of bulk supply of electricity for the main drives, allowed all available works steam plant to be used for the generation of auxiliary power. Contrary to more usual practice, but having regard to the relatively low speed requirements of the slabbing mill, advantage had been taken of the possibility of installing a driving motor of moderate size, coupled to the mill through high-efficiency reduction gear of 2/1 ratio. The product of the slabbing mill, after reheating, was conveyed by feed tables to the Lauth-type plate mill, which comprised all known mechanical and electrical devices for ensuring maximum economy of power and virtually eliminating human effort.

The heavy plate rolling mill plant at Colvilles, Ltd., Dalzell Steel Works, Motherwell, was of unusual interest in that practically every part of the plant had, during the past few years, been remodelled with no real interruption of production. Excepting only certain mills devoted to the production of armour plate, these mills, when considered in relation to weight and size of product, constituted the most powerful British examples of their respective types. Significant features were that the slabbing mill was electrically driven, whereas the plate mill was steam driven, and the heavy plate shears were hydraulically operated. What would appear to be divergent practice, in these respects, was not lightly adopted, and proved to be well founded in extended operation.

The merchant bar and wire rod mill at Dalzell Steel Works was of considerable local significance in being the first mill in Scotland to incorporate the continuous system of rolling. The operations of shearing, conveying on to the cooling bed and transfer across the latter were entirely automatic, the mechanism being set in motion by the front end of the rolled bar making contact with a master switch of flag type. Electrical details had received special consideration, and many novel features were incorporated; all conveying rollers were operated by direct-coupled fractional h.p. motor which eliminated intermediate gearing.

Dependence upon Public Supply

In South Wales the works of the Guest, Keen & Nettlefolds-Baldwins concern, which in a general sense were electrically operated throughout, were fortunately situated for service from the C.E.B. grid system. With alternative power also available from the Roath Road Station of the Cardiff Corporation, it had been possible to utilise the whole of the surplus blast furnace and coke oven gases for other purposes within the works.

The rod mill, working two billets simultaneously, was grouped for driving by five variable-speed motors, totalling 3,000 h.p. and, through the use of sleeve-type flood-lubricated bearings throughout, power consumption had been reduced to the remarkably low figures of 68 to 95 kWh per ton of finished product, these figures including all auxiliary services.

Richard Thomas & Co.'s blast furnaces were to utilise electrostatic gas cleaning and the rolling mill would mark a complete departure from all methods of sheet production previously used in Great Britain. All mill units were to be electrically driven, the total horse-power in the hot and cold mills approaching 70,000, of which 22,000 kW would be generated in the works' power station, the remainder being obtained direct from the C.E.B.'s grid system.

At the Stewarts & Lloyds mills, in Northamptonshire, electrical operation had been developed to a very high degree, not only of the main drives of the mill, but in the auxiliary feed tables, practically all rollers of which were provided with individual motors, thereby eliminating all geared transmission. Coils from both strip mills, after cooling and inspection, were transferred to the tube works, where they were manufactured into tubes by the Fretz-Moon continuous welding system. The strip as unwound from the coil was passed through the leveller, the end-trimming shear, and the flash welder for joining ends of successive coils, to the heating furnace and thence direct to the welding roll train.

The Royal Society

THE second of the two evening conversazioni held annually by the Royal Society (president: Sir William Bragg) took place on June 22nd (ladies' night) at Burlington House, Piccadilly. Some of the demonstrations seen on the first occasion (see ELECTRICAL REVIEW, May 27th, page 776) were repeated, while fresh exhibits included Mr. W. Greg Walter's transportable electro-encephalograph for investigating electrical waves emanating from the human brain. The instrument consists of two amplifiers, each with a maximum gain of about one million and incorporating a balanced input stage and 2-V high-frequency pentode valves in the later stages. The outputs are connected alternately to the y-plates of a portable battery-driven cathode-ray oscillograph by means of a rotating commutator by which also the spot is biased from side to side of the screen, so that the illusion of a double trace is obtained. The after-glow of the screen makes possible the inspection of the slow potential changes produced by the brain in cases of cerebral tumour, epilepsy and other conditions. By observation of the phase relations of these potentials abnormal areas of the cortex may be located. Normal alpha potential waves of the order of one fifty-thousandth volt appear at the rate of ten per second, whereas abnormal delta waves in the case of epilepsy are of the order of one twenty-thousandth volt at the rate of three per second. The nature of the delta waves is not completely understood, but they seem to be the characteristic electrical discharges of the cerebral cortex in some stage of dystrophy or degeneration. This instrument is being used at the central pathological laboratory of the London County Council hospitals for mental and nervous disorders and also at the Maida Vale Hospital for Nervous Diseases, London.

The research laboratories of the General Electric Co., Ltd., showed voice "pictures" by means of large cathode-ray tubes (16 in. diameter) associated with an amplifier and microphone. The National Institute of Industrial Psychology, among apparatus devised for occupational selection tests, exhibited a new form of voice "key" that functions without the aid of a thermionic amplifier.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Showroom Staleness

In the electrical industry there is always something to be learnt. New apparatus, good, bad and indifferent, is constantly making its appearance and often the public gets to know of it before we in the showrooms do. None of us likes saying, in response to a request for information, "I don't know the appliance you describe, but I'll find out about it." How infinitely to be preferred is the knowledge at one's finger ends: how much more efficient and convincing.

The usual avenues open for an increase of knowledge are, at best, somewhat dead ends. Brochures and leaflets set out loadings, prices, illustrations and virtues. The technical papers afford a description without comment. But this is not enough for those who are consulted as experts by consumers. We should investigate personally. How can the sales manager, or other responsible officer, expect maximum service when outside visits are the exception rather than the rule?

The officer responsible should be prepared to allow his staff to visit manufacturers' showrooms, factories, lighting installations, even demonstrations held by other undertakings. One day or half-day every month or even oftener could be allotted, the visiting being spread over all staff, junior as well as senior. Reasonable expenses should be allowed. The staff on their part must be prepared to render a written report on the visit, to study seriously the apparatus available for inspection and to convey to other members of the staff an apt description of what they have seen.

Perhaps there is a feeling that visits away on business other than the daily grind tend to constitute a kind of picnic. What if they do? Is there not an adequate recompense in the fillip to enthusiasm such a refresher would give?

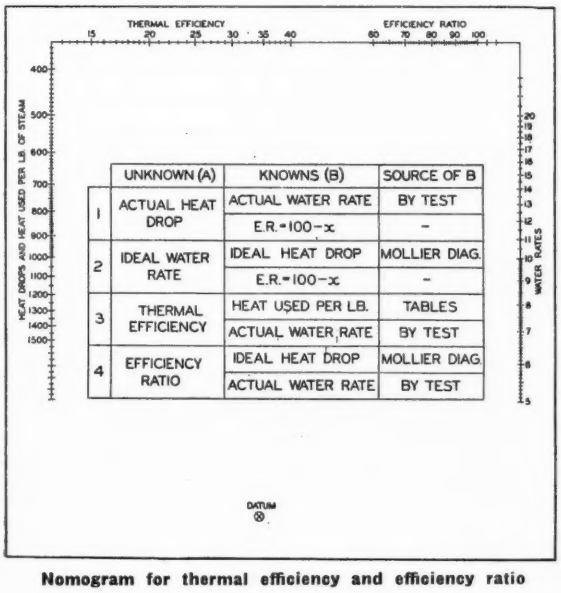
Some of us are lucky enough to work for a chief who expects us to know our job, who would be surprised if we did not know it, but who recognises that we need to seek knowledge further than the printed word. Speaking for myself, I have seen almost every kind of apparatus in course of manufacture and it is impossible with such knowledge to treat electrical appliances as "dead mutton."

The most enthusiastic person sometimes suffers from staleness and a mental astigmatism through being too close to his or her work. Visits to such institutions as the B.I.F., the I.M.E.A. Convention, the Ideal Home Exhibition and the Building Centre, besides acting as a "polisher" offer an opportunity for a valuable exchange of views. LUCIS.

June 25th.

Turbine Operating Data

In the ELECTRICAL REVIEW of June 3rd there appeared an article entitled "Turbine Operating Data," and a nomogram was given showing a method of relating the results. The nomogram, however, with seven verticals and a number of settings, appeared to me to be a little unwieldy. In an alternative here presented only three scales are used and (if approached by the same method) only one setting of the cursor is required.



	UNKNOWN (A)	KNOWNS (B)	SOURCE OF B
1	ACTUAL HEAT DROP	ACTUAL WATER RATE	BY TEST
		E.R.=100−x	-
2	IDEAL WATER RATE	IDEAL HEAT DROP	MOLLIER DIAG.
		E.R.=100−x	-
3	THERMAL EFFICIENCY	HEAT USED PER LB.	TABLES
		ACTUAL WATER RATE	BY TEST
4	EFFICIENCY RATIO	IDEAL HEAT DROP	MOLLIER DIAG.
		ACTUAL WATER RATE	BY TEST

Nomogram for thermal efficiency and efficiency ratio

The key information is given in the tabulation under sections 3 and 4, the procedure covered in the original article. The cursor, however, is slightly different, being in the form of a right-angled cross accurately marked on tracing cloth or celluloid somewhat larger than the chart.

If solving efficiency ratio or thermal efficiency, register opposite arms of the cross through the known values and traverse until the bottom arm registers with the datum point. The unknown is then read off under the fourth arm.

Sections 1 and 2 likewise enable the user to read off overall ideal water rate and overall actual heat drop by assuming efficiency ratio=100. This neglects alternator losses as in Mr. Belbin's method. A correction may, however, be made if the alternator losses are known by running the upper arm through 100−X instead of through 100. (X would be 3 approx. at 0.8 p.f.), thus giving in turn the true figures for energy at the coupling rather than at the terminals.

Taking the figures given in Mr. Belbin's article:—

		1	2	3	4
Heat expended per lb. of steam	1322	—	—	X	—
Ideal heat drop	457	—	X	—	X
Actual heat drop	402	X	—	—	—
Ideal water rate	7.5	—	X	—	—
Actual water rate	8.5	X	—	X	X
Thermal efficiency	30.1	—	—	X	—
Efficiency ratio	87.9	=100	=100	—	X
Datum	—	X	X	X	X

and joining any of the four sets marked "X" by joining points on opposite scale, the cross thus formed will subtend right angles at the point of intersection, thus proving that the chart gives exactly the same results. G. W. MAXFIELD.

Bristol, *June 23rd.*

Transparent Instrument Cases

In his article on "Improving Appearances" in your issue of June 10th Mr. J. H. Jupe says: "Maybe one day an instrument company will use transparent mouldings for its unshielded models." As a matter of interest we would point out that we have advertised such an instrument.

In our Specification A 662 we state:—"Instruments of the projecting pattern for educational purposes can be supplied with transparent covers. These enable the movement and other components to be inspected." There is, of course, no reason why such an instrument should be used only in educational institutions. CROMPTON PARKINSON, LTD.

London, W.C.2, *June 23rd.* V. J. FAULKNER.

Air Conditioning

In a series of articles in the ELECTRICAL REVIEW of April 1st you showed how air conditioning automatically brings in its train an additional and welcome power load by way of fans, pumps and refrigerator drives. Mr. E. M. Ackery states on page 453 that there is good reason to suppose that the total air-conditioning load in the U.S.A. is close to 1,000,000 h.p., and is increasing by leaps and bounds. This progress, however, has been possible largely due to the fact that the American water well industry is in a position to provide cheap underground water for very many air-conditioning plants.

All articles in the same issue, including that headed "American Air-Conditioning Ideas," take it as a matter of course that air-conditioning plants include refrigerators, whereas the genuine American idea is that air conditioning should be designed without any refrigerator whatsoever or with a minimum size refrigerator to chill water for cooling air. This American idea often enables the operating cost to be reduced many times as compared with refrigerator air conditioning.

I am afraid that without extensive use of underground water any substantial development of air conditioning in Great Britain is hardly possible, at least in the near future.

Shanghai, *May 9th.* M. F. KOCHERGINSKY, Dipl. Ing.

[Mr. Ackery comments on the above letter as follows:—"I have made an effort to obtain records of well water temperatures in this country but so far without success. Water from wells acquires a temperature corresponding very closely with the main annual dry bulb temperature of the district and is rarely available at less than 54 deg. F. If this water is used for cooling purposes, a temperature rise of 60 deg. F. may be allowed in order to limit the amount of water required to a reasonable volume, so that while being sprayed in the cooler or dehumidifier its temperature will be raised from 54 to 60 deg. F. Under maximum cooling conditions there is generally a difference of about 1½ to 2 deg. between the tem-

perature of the leaving water and the air temperature so that the minimum temperature to which the air can be cooled is about 62 deg. F.

"The air will, of course, be saturated at this temperature. In some cases air saturated at 62 deg. F. will be all that is required, but for comfort cooling, where moisture from the occupants supplements moisture content of the air leaving the conditioning plant, one really requires a leaving air temperature of not more than 50 deg. F. in order to create really desirable conditions in the room, so that in the majority of cases well water would be entirely out of the question. The lower temperature of 50 deg. is required chiefly for dehumidification and if air could be obtained at 62 deg. with a relative humidity of, say, 50 per cent., this would be quite satisfactory.

"Another difficulty in the use of well water is the quantity required. If a temperature rise of 6 deg. F. is assumed, each ton of refrigeration will require 200 gallons of water per hour, while with a refrigerating compressor, where well water is used for condenser cooling, this quantity would be reduced to less than one-third, as a temperature rise of about 20 deg. could then be allowed. A further drawback is that the refrigerating period does not as a rule exceed half the year, so that unless the water can be used for some other purpose it would scarcely be worth while sinking a well for air conditioning alone.

"I understand from one firm of air-conditioning engineers who have done a great deal of work in America that in their opinion not more than 1 per cent. of the air conditioning in America is being done by means of well water, in spite of the fact that owing to the lower mean annual temperature in America the well water there is usually at a lower temperature than in this country."]

Illegible Signatures

Your correspondent "Advertiser" is quite right in what he says about signatures, but he overlooks the old saying that it's only men with brains who write their names so that no one can make them out.

I have had experience with directors who could scarcely write their names but were in receipt of salaries of £5,000 a year.

I have a letter in front of me with a question on the top as follows: "How rote thes leter." And another from a director in his own handwriting, where he said he was sorry he could not reduce the "prize" (price).

London, W.1, *June 24th*. DONALD SINCLAIR.

Municipal Transport Conference

Problems discussed at Morecambe

THE thirty-seventh annual conference of the Municipal Tramways and Transport Association was held at Morecambe from June 22nd to 24th. In his presidential address Alderman A. H. Gledhill dealt with the proposed national transport policy which was being pressed upon the public by political leaders, economists and financiers, and said that those who believed in municipal ownership of road passenger transport services must be prepared to meet this challenge. There were, he said, many schools of thought. Some advocated a State monopoly of all canals, railways, coastwise shipping, passenger transport services and goods transport, while others advocated a monopoly to be owned and operated by a public utility company or board. Some advocated large scale operations by area boards. Others advocated grouping of the municipal services where there were common boundaries.

Mr. W. C. Jeary inspects the gear in the car which Wm. Sanders and Co. had at the Contractors' Conference last week

It would, the President considered, be unfair and illogical to advocate State control by implying deficiencies in municipal operation when the State itself had limited their powers of development by statute and the county councils had opposed extensions of municipal passenger transport systems outside the borough boundaries. Since the advent of the electric tramcar, municipalities had given magnificent local passenger transport services to millions of people daily for over forty years at low fares and with the highest degree of safety. The advent of the bus had brought many new problems.

The first stage in combating present tendencies towards State ownership was for Councils to delegate greater powers to their transport committees in order to allow them to act more quickly. Furthermore, any attempt by other interests to interfere with the proper decision of a transport committee should be met with the united opposition of all the municipal transport undertakings in the country.

The President urged municipal authorities to view their problems in the light of public interest, co-ordination with existing services being the best answer to the arguments advanced for a National Transport Board. The statement that small units were uneconomic was more easily made than proved. Could paid officials under a State monopoly do the job as well and as economically as the municipalities were doing it to-day?

Such a National Board would have to assume responsibility for operating economically 3,616 miles of waterways, 20,500 miles of railway, 180,000 miles of highway, 14,000,000 tons of merchandise and 35,000,000 tons of coastwise shipping, and it was inconceivable that any single group of men could efficiently control so gigantic an industry.

Annual General Meeting

At the annual general meeting which followed, Mr. J. M. Calder (general manager and engineer, Reading Corporation Transport) was elected president for the coming year, and Ald. G. Hill (chairman, Burton-on-Trent Corporation Transport Committee) was elected vice-president. The following were elected to the Council:—Ald. A. J. Bailey (chairman, Sheffield); Ald. A. Rudd (chairman, St. Helens); Ald. T. J. Gooding (chairman, Leicester); W. Forbes (manager, Cardiff), and A. C. Baker (manager, Birmingham). Ex-Ald. T. S. Canby (Huddersfield) was elected an honorary member of the Association.

Mr. A. C. Baker (general manager, Birmingham), in a paper on peak loads and "staggered" hours, said that unless "staggering" of hours of employment was more universally adopted, the only alternative in his case would be to go underground, but he did not anticipate that that would prove self-supporting and the burden on the ratepayer or taxpayer would be too great.

The Position of Tramways

In another paper dealing with "Modern Problems of Municipal Passenger Transport" Mr. G. F. Craven (general manager, Halifax Corporation Transport Committee and manager of the Halifax Corporation, L.M.S., and L.N.E.R., Joint Omnibus Services), emphasised the fact that had a policy of more complete maintenance and scrapping been adopted with tramways some years ago, the tramcar would have held its own for a much longer period. Mr. R. S. Pilcher (general manager, Manchester) agreed with this statement but said that even the latest tramcar could not compete with the buses. Moreover, the public preferred the bus. Ald. Sir William Davy (chairman, Manchester) said that while trolley buses might be the best in certain circumstances, he considered them, generally speaking, no more mobile than trams. In twenty years or so we should be as anxious to get rid of them as we were now the trams.

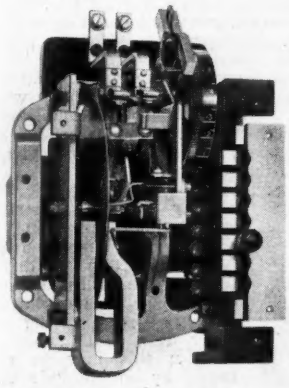
At the annual dinner on June 22nd Mr. J. Barnard (general manager, Bolton) spoke of the satisfactory manner in which the Traffic Commissioners generally had carried out their work and claimed that the procedure now was very much more economical both in time and money as compared with the old procedure.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Over-current and Earth-leakage Relays

A new design of induction-type protective relay with combined inverse and definite-minimum time lags has been brought out by A. REYROLLE & CO., LTD., Hebburn-on-Tyne.



The Reyrolle protective relay

The TJY relay consists essentially of an induction disc motor and gravity-controlled copper-silver moving contacts geared to each other through a pinion and a quadrant. The motor has two electromagnets; one is E-shaped with a primary coil connected in the main current-transformer circuit and a secondary coil which excites the other, U-shaped, magnet. The fluxes of the two magnets differ by about 90 deg. and their interaction with the eddy currents induced in the disc produces a high torque. Rotation of the disc spindle lifts the quadrant so that a free-moving self-aligning contact bridges the fixed contacts. One or two pairs of circuit-closing contacts for tripping one or two circuit breakers can be arranged, or one pair of circuit-opening, self-resetting contacts for giving a positive break for a.c. tripping.

The time-current characteristic is provided by the eddy-current braking effect of a permanent magnet. Adjustment of the definite minimum time lag can be effected independently by altering the travel of the quadrant. Tappings from the energising coil of the electromagnet are brought out to a row of contacts with which the current-setting plug engages. With the maximum time setting and currents up to 100 per cent. of the plug setting, the torque is insufficient to overcome the gravity control of the quadrant. At 130 per cent. of the plug setting the contacts close after 30 sec. and at 1,000 per cent. after 3 sec.; thereafter the decrease in operating time is very slight. Standard settings for over-current protection are in seven stages from 50 to 200 per cent. of normal current, advancing by 25 per cent. each, and for earth-leakage protection in a similar number of stages from 10 to 70 per cent., advancing by 10 per cent. For ring-main protection, a similar relay, but directional (type TJEY) is available.

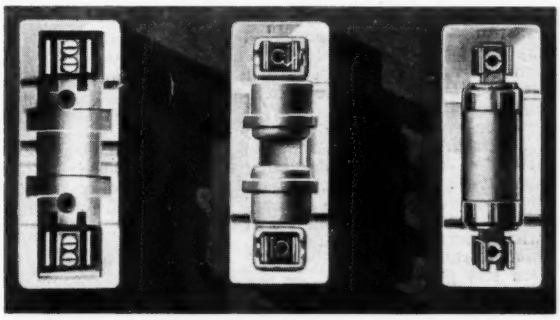
A Fuse Unit

From WM. SANDERS & CO., LTD., Falcon Electrical Works, Wednesbury, we have received a sample of the new "Sandaspeed" duplex fuse unit.

It is available in two forms—"W.L." for wire and "C.L." for cartridges. The "W.L." carrier is of the rewirable, semi-enclosed pattern tested in accordance with B.S.S.88, and certified by independent tests as suitable for use where prospective fault currents do not exceed 4,000 A.

The "C.L." carrier is designed to accommodate non-deteriorating cartridges, of either English Electric or Reyrolle manufacture, and is thus suitable for use where prospective fault currents do not exceed 33,000 A.

Any existing Sanders switch-fuse of 30, 60 or 100 A capacity can be fitted with these units, which may also be incorporated in fabricated steel case fuseboards. The adaptability of these units to every class of duty, at a moment's notice, merely by substituting the appropriate fuse carrier, is a considerable advantage.



The new "Sandaspeed" fuses

Domestic Dish-washing Machine

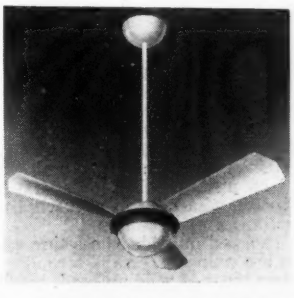
Another recently introduced product is a domestic dish-washing machine which operates by means of air blown through injectors at the bottom of the machine, forcing the water up in strong jets. These jets impinge on the crockery and together with the vigorous agitation of the water, clean the contents of the basket.

Four models are available, the two smallest, which fit into the sink or can be stood on the draining board, can be supplied with an air heater to warm the water. In all cases a universal motor is fitted.

These appliances are sold by the LIGHTFOOT REFRIGERATION CO., LTD., Abbeydale Road, North Circular Road, Wembley.

Fans for the Indian Market

A considerably greater efficiency, as a result of a change in design, with a corresponding reduction in running costs, is claimed by CROMPTON PARKINSON, LTD., Bush House, Aldwych, London, W.C.2, for a new range of a.c. ceiling fans, specially produced in India for the Indian market. They have been named the "Indus" (60-in. sweep), "Sutlej (48-in. sweep), "Kistna" (56-in. sweep), and "Tapti" (36-in. sweep). Special attention has been given to appearance, and three different colour schemes are available. A new type of regulator gives twelve operating speeds.

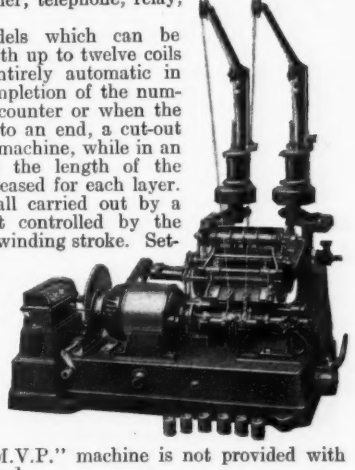


A new Crompton Parkinson fan for India

Coil-winding Machines

F. L. LESINGHAM, 5, Victoria Street, London, S.W.1, are now marketing some new types of "Kandulla" coil-winding machines for transformer, telephone, relay, radio, &c., work.

The "P.V.A." models which can be supplied for dealing with up to twelve coils simultaneously, are entirely automatic in operation. On the completion of the number of turns set on a counter or when the wire breaks or comes to an end, a cut-out immediately stops the machine, while in an automatic paper feed the length of the paper is gradually increased for each layer. These operations are all carried out by a single electric magnet controlled by the stops at the end of the winding stroke. Setting for different wire gauges is effected by turning a crank handle on a friction disc gear.



The "Kandulla" type "PVA" coil-winding machine

The lower-priced "M.V.P." machine is not provided with the automatic paper feed.

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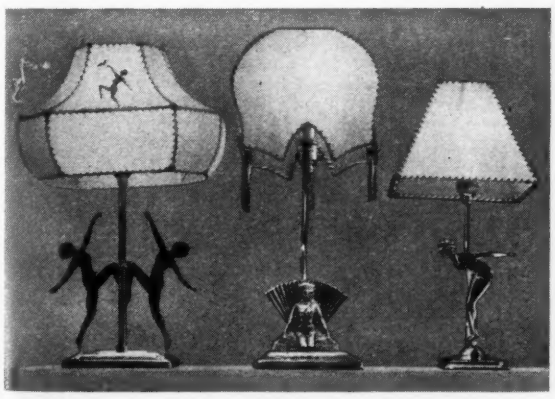


Three new figure fittings made by the Ducaware Mfg. Co., 170, Hockley Street, Birmingham

Switchgear Developments

The SIMPLEX ELECTRIC CO., LTD., Broadwell Road, Oldbury, Birmingham, has lately introduced a number of new developments in switchgear. Single-pole and neutral, double-pole and neutral and four-pole models have been added to several designs, and an entirely new introduction is a range of watertight switch-fuse boards.

These boards are operated by external handles, and the fuse banks are hinged by an arrangement in which all external screws are avoided. The conduit inlets are tapped in the case ends and are arranged on the centre line of the case to avoid the unnecessary weight associated with the thickening up of the whole of the end wall. Special attention has been given to ensure a waterproof joint between the covers of the switch and fuse compartment.

An entirely new range of heavy switchgear is the "Monarch," with a rupturing capacity of 200-300 A at 500 V, complying in its design with Home Office and I.E.E. requirements. Parallel break is another feature, and double drive mechanism is employed. The end plates are detachable and in or out wiring can be taken at each end. Normally cast-iron end plates are provided, but detachable split wooden end plates may be provided. For multicore armoured cable a special split end box is provided, giving the necessary space for the spreading of the cable cores, and in addition, provision is made for sealing if required.

Another newcomer is an interlocking switch-plug with a "non-mutilated" earth pin. All the mechanism is carried on the lid, the wiring is simple and there is adequate space for slack wire to be tucked away when replacing the covers. General construction is similar to No. 7070; it is retained in the "on" position by a screwed ring, which, unless screwed fully home will not permit movement of the switch. On the other hand, unless the plug is in, the switch cannot be operated. This is brought about by a special arrangement which operates inside the earth socket by co-operating with the bottom of the earth pin. Unless the earth pin travels fully home the switch is not released. The plug has two diagonally arranged external fixing feet. Both 5- and 15-A sizes are available.

Simplex watertight switch and fuseboard, "Monarch" switch, and interlocking switch-plug

Electric Welding Equipment

Several welding machines embodying new features in design have been introduced recently by BRITISH INSULATED CABLES, LTD., Prescot.

These include a portable spot welder for assembling articles which cannot conveniently be taken to a fixed welding machine, and frequently used on jig assemblies. The transformer is mounted in a metal case, which may be on wheels, and to which is attached the control apparatus.

Heavy section flexible leads enclosed in rubber hose through which cooling water circulates are connected to the secondary of the transformer, to which two types of welding head, pinch or pencil, can be attached. A 20-kW machine with a pencil head can be used for spot welding in any position within the range of the 10-ft. leads.

When a predetermined mechanical pressure is applied to the head a control switch closes automatically. The aluminium alloy welding head is light and portable, for the fabrication of sheet steel articles.

Another new machine is an automatic flash butt welder rated at 40 kW for mild steel sections up to 1 sq. in. area. Clamps can be fitted to take any desired shape of work, one fixed on the slide of the machine while the other is adjustable for both vertical and transverse alignment. The clutch, engaged by hand, connects the 1½-h.p. motor through reduction gearing to the main driving cam, and the remainder of the cycle of operations, concluding with the disengagement of the clutch, is then performed automatically.

Engagement of the clutch causes the operating cam to rotate, this in turn controls the movement of the slide which is fed forward slowly, for approximately ¾ of a revolution of the cam, while flashing takes place, the material at the joint being burned away and raised to welding temperature. A steeper part of the cam profile then puts the upsetting pressure on the weld, while the movement of the slide operates a knock-off switch, interrupting the main welding current. When the cam has completed a full revolution (in about four seconds) the clutch disengages, leaving the machine ready to start a further cycle.

This type of machine is largely used for the welding of steel casement frames, both mitre and T-joints being commonly made.

The No. 120 power driven 12-kW welder will make individual spots or a continuous series at speeds ranging normally from 60-120 spots per minute; this may be controlled by an infinitely variable gear box in the ratio of 2-1, or have a constant speed drive. The rocking head is operated by an eccentric mounted on the back shaft, together with a cam for controlling the primary current; this shaft is driven through a special clutch which will remain engaged so long as pressure is applied to the operating pedal. Alternatively when pressure is applied momentarily only, the shaft will complete one revolution before the clutch disengages.

The machine is suitable for welding continuously two pieces of mild steel of up to 0.072 in. added thickness, and can be used to make fluid-tight joints by arranging the spots to overlap. This method has advantages over seam welding when the shape of the work prevents disc electrodes being used conveniently.

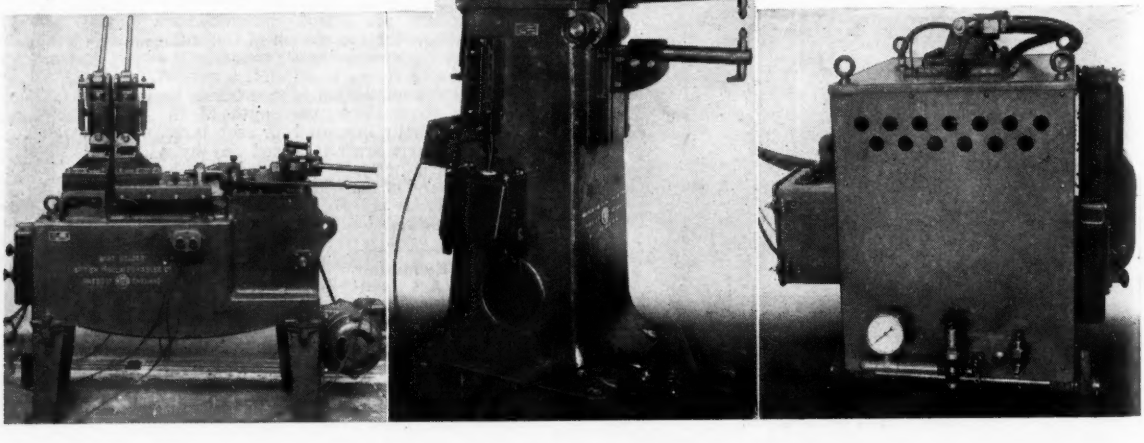
Washing Machines

Probably the most outstanding feature of five new "Connor" electric washing machines announced by ISMAY DISTRIBUTORS, LTD., Sterling Works, Dagenham, Essex, is their substantial construction. Much heavier metal than usual is employed for the tubs and bodywork, while practically all the components of the wringers are cast. All the gears are steel cut and run in an oil bath.

The agitators are provided with clutches operated by pressing the tops, and the self-adjusting 2¾-in. soft rubber rollers run on Skefco ball bearings. Pumps, where incorporated, are of the belt-driven centrifugal type.

The two cheaper machines have plain porcelain tubs, but the three "Thermo" models are fitted with special "streamlined" tubs and lids lagged with mineral wool. Various attractive colour and plated finishes are available, the dearest model being made in monel metal. A four-year guarantee is given with the "Thermo" machines and a two-year one for the other models. There is also a twelve-year reconditioning guarantee.

B.I. butt and spot-welders and spot-welder transformer



United States Electrical Exports

Canada's Large Share

THE annual volume for 1936, showing full details of the destinations of American exports, has recently been issued at Washington, and from it the following figures relating to shipments of electrical goods have been taken, a note being added of increases or decreases as compared with 1935. It is not possible in the space available here to show more than some of the outstanding items of interest to the British electrical trade, and it should be mentioned that Cuba and the Philippines have been omitted, in view of the favourable position held there by the United States.

In the trade generally there was a continuance of the recovery which began in 1933, and the total value of exports amounted to $91,352,000, of which $28,279,000 represented radio apparatus—a very progressive group. The comparative total in 1935 was $76,088,000. Among British Empire markets it will be seen that South Africa was a better customer for many descriptons of apparatus.

There were also large total increases to the United Kingdom and Canada but only small ones to Australia and New Zealand, while to India exports were only just maintained. Soviet Russia appeared as a good customer in certain groups, and progress continued in the Latin American markets.

	1936 $(000).	Inc. or dec. on 1935 ($000).
Generators, d.c.—		
Total	345	+ 183
To Canada	38	+ 16
„ Mexico	26	+ 1
„ Brazil	62	+ 57
„ South Africa	33	+ 31
Generators, a.c., under 2,000 kVA—		
Total	246	— 28
To Mexico	44	— 11
„ Brazil	26	— 9
„ Canada	28	+ 11
Generators, a.c., 2,000 kVA and over—		
Total	116	— 212
To Spain	81	— 30
„ Soviet Russia	12	+ 12
Steam turbine generator sets—		
Total	255	— 4
To Argentina	112	+ 97
„ Brazil	66	+ 63
Accessories and parts for generators—		
Total	667	+ 349
To Canada	105	+ 52
Arc welding sets—		
Total	720	+ 217
To Mexico	80	+ 29
„ Canada	106	+ 54
„ Soviet Russia	111	+ 68
Self-contained lighting outfits—		
Total	650	+ 365
To China	35	+ 20
„ South Africa	85	+ 40
„ Venezuela	45	+ 30
„ Canada	86	+ 69
„ Argentina	37	+ 31
Batteries, 6 and 12 V storage—		
Total	1,223	+ 112
To South Africa	197	+ 33
„ Holland	75	+ 4
„ India	124	+ 26
„ Mozambique	40	+ 3
„ Venezuela	49	+ 18
Other storage batteries—		
Total	595	+ 52
To Argentina	255	+ 43
„ Canada	76	+ 8
„ Mexico	68	— 22
„ South Africa	120	— 1
„ Chile	76	+ 24
No. 6 dry-cell batteries—		
Total	196	— 41
To Argentina	54	+ 6
„ Newfoundland	18	— 4
Flashlight batteries—		
Total	2,300	+ 338
To Argentina	184	+ 48
„ Colombia	193	+ 58
„ India	743	+ 83
„ Malaya	197	— 75
„ Siam	140	+ 9
„ South Africa	145	+ 23
Radio B. & C. dry batteries—		
Total	452	+ 109
To Argentina	213	+ 59
„ South Africa	49	+ 4
Other wet and dry primary batteries—		
Total	137	+ 26
To Canada	17	—
„ South Africa	22	— 4
Power transformers, 500 kVA and over—		
Total	363	+ 265
To Brazil	100	+ 74
„ Spain	133	+ 113
Distribution transformers, less than 500 kVA—		
Total	432	+ 75
To Mexico	40	— 14
„ Venezuela	37	— 2
„ Colombia	71	+ 7
„ Argentina	40	+ 36
Instrument transformers—		
Total	147	— 2
To South Africa	17	— 24
„ Brazil	30	— 4
Other transformers—		
Total	392	+ 129
To Canada	34	+ 5
„ Mexico	70	+ 21
„ Argentina	40	+ 33
Double current and motor generators, converters, etc.—		
Total	529	+ 257
To Peru	81	+ 19
„ Canada	79	+ 41
„ Soviet Russia	89	+ 88
Switchboard panels, except telephone—		
Total	440	+ 118
To Argentina	60	+ 51
„ Australia	97	+ 84
Power switches and circuit breakers over 10 A.—		
Total	1,127	+ 173
To Canada	251	+ 77
„ Mexico	100	+ 11
„ South Africa	85	— 192
„ Brazil	146	+ 60
Watt-hour and other measuring meters—		
Total	446	+ 53
To Mexico	58	+ 11
„ Brazil	37	—
Indicating instruments—		
Total	533	+ 16
To United Kingdom	66	— 7
„ Italy	72	— 27
„ Canada	102	+ 24
Recording instruments—		
Total	274	+ 18
To United Kingdom	34	+ 10
„ Canada	25	+ 3
„ Soviet Russia	75	+ 37
Other testing apparatus—		
Total	949	+ 201
To Canada	364	+ 147
„ Soviet Russia		
„ Japan		
„ United Kingdom	120	+ 23
Lightning arrestors, choke coils, etc.—		
Total	452	— 46
To South Africa	47	— 31
„ India	58	+ 16
„ Canada	54	+ 13
Motors, ½ h.p. and under—		
Total	679	+ 139
To United Kingdom	90	— 13
„ Canada	248	+ 128
Motors, over ½ and under 1 h.p.—		
Total	296	+ 87
To Argentina	94	+ 69
„ Canada	63	+ 32
Stationary motors, 1–200 h.p.—		
Total	1,350	+ 334
To Canada	127	+ 52
„ Mexico	132	— 35
„ South Africa	122	+ 77
„ Soviet Russia	224	+ 173
„ Argentina	117	+ 72
Stationary motors, over 200 h.p.—		
Total	116	— 7
To South Africa	33	— 21
Railway motors—		
Total	140	+ 64
To South Africa	82	+ 21
Elec. locomotives, railway—		
Total	114	+ 61
Elec. locomotives, mining and industrial—		
Total	429	+ 83
To Canada	67	+ 17
„ South Africa	48	— 68
„ Mozambique	73	+ 29
„ Chile	60	+ 60
Electric trucks—		
Total	162	+ 7
Starting and controlling equipment for railway and vehicle motors—		
Total	751	+ 548
To Soviet Russia		
„ South Africa	586	+ 572
Ditto, for industrial motors—		
Total	1,162	+ 339
To Canada	393	+ 46
„ Mexico	79	— 4
„ South Africa	55	— 3
„ Soviet Russia	86	+ 56
„ United Kingdom	82	— 1
Portable electric tools—		
Total	910	— 40
To United Kingdom	254	+ 17
„ Canada	151	+ 57
Accessories and parts for motors—		
Total	1,660	+ 230
To Canada	431	+ 118
Household refrigerators—		
Total	11,768	+ 2,414
To France	580	— 206
„ United Kingdom	2,056	+ 1,156
„ South Africa	1,841	+ 313
„ Mexico	415	+ 106
„ Brazil	894	+ 204
Commercial refrigerators—		
Total	2,234	+ 258
To United Kingdom	396	+ 166
„ France	266	— 94
„ South Africa	168	+ 88
Electric fans—		
Total	548	+ 188
To Canada	103	+ 61
Incandescent lamps for automobiles, flashlamps, etc.—		
Total	357	+ 127
To India	92	+ 16
Other metal filament lamps—		
Total	826	+ 86
To Argentina	126	+ 63
Other electric lamps—		
Total	141	+ 47
To Canada	36	+ 9
Household washing machines—		
Total	1,066	+ 512
To Canada	257	+ 137
„ United Kingdom	179	+ 104
Domestic vacuum cleaners—		
Total	509	+ 175
To Australia	63	— 16
„ United Kingdom	228	+ 121
Flat-irons—		
Total	225	+ 45
To Argentina	42	+ 22
Cooking ranges—		
Total	365	+ 95
To South Africa	103	+ 43
„ Mexico	81	— 4
Electric furnaces, etc.—		
Total	616	+ 216
To Soviet Russia	122	+ 51
X-ray Apparatus, etc.—		
Total	1,474	+ 54
To Canada	402	+ 62
„ Mexico	112	— 3
„ United Kingdom	173	+ 51
Radio transmitting sets, valves and parts—		
Total	1,817	+ 237
To Mexico	129	+ 29
„ Brazil	123	+ 46
„ Canada	99	— 1
„ Chile	127	+ 107
„ Soviet Russia	102	+ 88
„ China	343	+ 203
Receiving valves—		
Total	3,514	+ 634
To France	250	+ 10
„ Italy		
„ Canada	264	+ 24
„ Argentina	526	+ 26
„ Australia	315	+ 5
„ Belgium	392	— 38
„ United Kingdom	355	+ 241
Receiving sets—		
Total	16,041	+ 571
To Belgium		
„ France	540	+ 50
„ Spain		
„ United Kingdom	1,470	— 130
„ Mexico	2,086	+ 656
„ Brazil	1,418	+ 1,168
„ South Africa	2,017	+ 477
Receiving set components—		
Total	5,660	+ 90
To Argentina	754	+ 24
„ Canada	1,356	+ 336
Loudspeakers—		
Total	706	+ 246
To Canada	218	+ 147
„ Sweden	105	+ 34
Other receiving set accessories—		
Total	540	+ 50
To Argentina		
„ New Zealand	51	+ 19
„ Canada	99	+ 25
Telegraph apparatus—		
Total	227	+ 47
To Canada	79	+ 54
„ Soviet Russia	45	+ 9
Telephone instruments—		
Total	186	— 54
To Brazil	81	+ 28
Other telephone equipment—		
Total	1,841	+ 157
To Canada	621	+ 207
„ Colombia		
„ Brazil	293	+ 3
„ China		
„ Australia	242	+ 52
Starting, lighting and ignition equipment (except spark plugs)—		
Total	1,317	+ 97
To Canada	331	+ 67
„ Belgium	81	— 24
Insulating material—		
Total	347	+ 47
Metal conduit and switchboxes—		
Total	625	+ 85
To Brazil	87	+ 7
„ Colombia		
„ Argentina		
„ Mexico	50	— 4
„ Canada	96	+ 31
Lighting switches, sockets, etc.—		
Total	775	— 40
To Mexico	66	— 4
„ Canada	181	+ 47
„ United Kingdom	63	— 147

Parliamentary News (BY OUR SPECIAL REPORTER)

Explosions in Mines

In the House of Commons on June 21st Mr. Sexton asked the Secretary for Mines if he would state the number of coal-mine explosions attributable to the use of electricity in England and Wales and Scotland, respectively, during the last available ten years, together with the number of fatal and non-fatal accidents arising from such explosions in each of the ten years.

Captain Crookshank said that the following was the information:

	Scotland.				England and Wales.			
Year.	No. of Fatal Accidents.	No. of Deaths.	No. of Non-fatal Accidents.	No.* Injured.	No. of Fatal Accidents.	No. of Deaths.	No. of Non-fatal Accidents.	No.* Injured.
1928	3	5	—	9	1	3	—	—
1929	—	—	—	—	1	9	1	7
1930	1	1	1	11	1	2	—	2
1931	1	10	1	2	1	8	—	3
1932	—	—	—	—	1	27	—	36
1933	—	—	—	—	1	6	—	17
1934	2	4	1	7	1	2	2	7
1935	1	3	1	5	—	—	1	2
1936	2	3	—	2	2	61	1	2
1937	1	2	1	4	1	9	1	4
Totals	11	28	5	40	10	127	6	80

* Including persons injured by explosions which proved fatal to others.

Northern Railway Electrification

On June 22nd Major Procter asked the Minister of Transport if his attention had been drawn to the slow train service between Manchester, Accrington and Colne; and if he would consult with the railway company as to the possibility of electrifying this route.

Mr. Burgin said he was informed by the London, Midland and Scottish Railway Co. that it was introducing improved services on this line in July. The company said it would not feel justified, in existing circumstances, in incurring the expenditure involved in electrifying this route. He understood that the whole problem of the transport services in this part of Lancashire was to be the subject of a conference next month between representatives of the local authorities, trading bodies and operators of various forms of internal transport.

Live Rail Deaths

On June 22nd Mr. W. Green asked the Minister of Transport whether he could state the number of children who had been killed during the last 12 months as a result of contact with the live rail on electrified railways in this country.

Mr. Burgin said that during the twelve months ended May 31st last ten children, all of whom were trespassing, were fatally injured through coming into contact with the live rail on electrified railways in this country.

Mr. Green asked the Minister of Transport whether he could state the number of instances in which coroners' juries had adversely criticised the Southern Railway during the last 12 months in respect of deaths of children to which inadequate protection of electrified lines had contributed.

Mr. Burgin said that during the twelve months ended May 31st last eight children were fatally injured through coming into contact with the live rail on the Southern Railway. In two cases the coroner's jury commented adversely on the fencing provided.

New Trolley Vehicle Routes

Fifteen trolley vehicle routes in Newcastle-on-Tyne are authorised by a Bill which was submitted on June 23rd to the Select Committee of the House of Commons on Unopposed Bills. The routes have a total length of about 12¼ miles and some eight miles of them are now tramway routes. They are all within the city with the exception of a portion of one route which extends for about half a mile into the adjoining urban district of Newburn. The Committee ordered the Bill to be reported for third reading.

The Committee also approved on June 23rd a Bill authorising Ipswich Corporation to operate three new trolley vehicle routes, portions of which extend outside the borough. The Corporation was first authorised to use trolley vehicles in 1925 and now has routes with a total length of about 21 miles open for traffic. The Bill was reported for third reading.

West Midlands Electricity

Additional borrowing powers to the amount of £5,000,000 are sought by the West Midlands Joint Electricity Authority and a Bill for the necessary authorisation was considered on June 23rd by the House of Commons Committee on Unopposed Bills. The amount of loans already sanctioned for the Authority by the Electricity Commissioners is £4,800,887. Applications for further loans to the amount of £927,210 are now before the Commissioners. The further powers now sought are required to meet the excess of the present outstanding loan applications over the £5,000,000 which the Authority is now authorised to borrow and also for the purpose of financing the general development of generation, transmission and distribution of electricity in the Authority's area during the next few years.

After hearing a statement to the above effect from a representative of the Ministry of Transport the Committee ordered the Bill to be reported for third reading.

In the Courts

Battery Trade Mark Dispute

In the Chancery Division on June 28th Mr. Justice Morton had before him an application by the General Electric Co., Ltd., for an order that Vince's Dry Batteries, Ltd., applicants for the registration under the Trade Marks Acts, 1905-1919, of the trade mark "Marathon," should give discovery of certain documents relevant to the issues in the matter.

Mr. R. Burrell, K.C., in support of the application, said that the General Electric Co., which opposed the registration, desired the applicants to state whether they had in their possession documents relating to the issue whether the mark applied for was *bona fide* used by the applicants for two years prior to the date of the application; as to whether the mark had been abandoned by the applicants; and whether at the date of the application the mark was not used or proposed to be used by the applicants. The application for registration was made on February 9th, 1935, and the Registrar's decision was dated February 5th, 1938. The opponents were successful and the Registrar refused registration on the ground that the name sought to be registered was geographical. The applicants were appealing from the decision of the Registrar and the present application for discovery was made in connection with that appeal, which was to be heard in the Chancery Division.

The opponents' case was that for a short time prior to the application they themselves adopted the word "Marathon" as their trade mark. They applied for registration on January 25th, 1935, fourteen days prior to the date of the application by Vince's Dry Batteries, Ltd. The application by the General Electric Co. was refused because the mark was geographical and also on the ground that the company had not used it at the date of the application.

The General Electric Co. had been using the mark since at least February 4th, 1935, and had sold over 15,000 batteries under that name. It had the evidence of several dealers to show that the mark "Marathon" indicated the company's goods. His Lordship would appreciate how serious the matter was to the opponents as if the application of Vince's Dry Batteries succeeded it would date back to the date of the application, *viz.*, February 9th, 1935, and the opponents' user of the mark might well be an infringement.

The opponents challenged the allegation that the mark had been continuously used by the applicants for two years prior to the application and said that if it had been used the user was limited to the batteries supplied to the Super Radio Co., Ltd., Bradford, and was used as a trade mark for that company. There might be correspondence that had passed between the Super Radio Co. and the applicants. The Ever Ready Co. took over the control of Vince's factory in 1924.

Mr. Lloyd Jacobs, for Vince's Dry Batteries, Ltd., submitted that the discovery sought was burdensome and should be refused. His clients raised no objection to disclosing any specific documents if the opponents would indicate them.

In the result his Lordship said he should make an order for discovery of documents as claimed. On Mr. Jacobs' application he granted leave to appeal from his decision.

Compensation for Linesman's Widow

An award of £150 was made at Bolton County Court on June 22nd to Mrs. Edith Hart, Openshaw Place, Plodder Lane, in respect of the death of her husband, who touched a live wire while working for the Lancashire Electric Power Co.

Mr. Morris said that Hart was employed as a linesman, and during the three years prior to his accident he earned £331. He was a young man with considerable prospects. His widow, to whom he had only been married three and a half months, was employed and previously earned £1 8s., but had not earned an average of £1 a week since Christmas. Mr. Greenhalgh submitted that when her husband was alive Mrs. Hart was not dependent upon him.

A Slippery Shilling

An unusual defence was submitted on Monday at Wrexham Court, when Lydia Rowlands and her son, Richard Elwy Jones, were fined £1 each on the allegation that they had obtained electric current fraudulently.

A Corporation collector found that the meter at the female defendant's house contained 9s. 7d. only, instead of £2 0s. 10d., and that it had been tampered with. The son told the police that his mother requested him to look at the meter, as a coin had stuck. To test the instrument, he inserted a shilling, which passed through and returned to his hand. He repeated this several times—not realising that it was recording and providing for current.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

The Royal Show, Cardiff

An electric farm, complete with farmhouse, cow sheds, dairy, bottle sterilising sheds, incubator and egg-grading rooms, an electro-horticultural section, workshops, &c., will be the British Electrical Development Association's contribution to the Royal Show which is to be held at Cardiff from July 5th to 9th. The General Electric Co., Ltd., Petters, Ltd., and Ruston & Hornsby, Ltd., will be among those having individual exhibits. On Wednesday afternoon a farmers' electrical conference will be held at which a paper on "Development in Uses of Electricity in Rural Wales" will be read by Mr. W. H. Jones, of the Department of Agricultural Economics, University College of Wales, Aberystwyth.

Topical Window Displays

Striking window displays on original themes have been arranged by the General Electric Co., Ltd., at Magnet House, Kingsway, W.C.2. One window is devoted to table fans. This show is given an arresting and topical flavour by a caption suspended in the background: "The Nation's Defence Against Hot Air Raids." The centrepiece consists of two fans facing

A clever display of table fans by the G.E.C. at Magnet House, Kingsway, W.C.2

each other; attached to their circular guards are several lengths of thin rope drawn taut in an upward direction, so that they cross near the top of the window, giving a realistic impression of searchlights in action. The two fans are kept in operation, thus imparting a slight movement to the two "searchlight beams." Another window, featuring small domestic appliances, extends an invitation to "have breakfast with the G.E.C." On one side the breakfast gong is being sounded, while on the other is an impressionist glimpse of the family racing to the table. In the forefront is a neat array comprising a coffee percolator, toaster, warming plate, kettle, &c. Each article is connected to the gong by a thin tape. A third display is given to "Coldair" domestic refrigeration. One model is shown, open and stocked with food. The word "Coldair," carved in wood in the familiar script with a novel shadow effect, is connected by tapes to the Arctic regions on a globe of the world. The message is "Bring Arctic Conditions to your Kitchen."

Manchester Electrical Circle

Prices of domestic installations under the scheme operated by members of the Manchester and District Electrical Circle were the subject of comment by Mr. G. M. Brewster at a meeting held last week. He explained that some members of the Circle considered the time opportune for a review of charges for a small number of points. Costs of materials had increased about eight months ago, but since then cable and certain accessories had shown some tendency to become cheaper. It was decided to send a letter on the question to Electrical Facilities, Ltd., inviting their comments. Trouble has been experienced by one or two members owing to the demolition of property in which installations have been carried out. It was stated that in Manchester itself it was impossible to get a service in houses which were due for demolition within five years. Two members were appointed to make inquiries. Concerning the proposal that electrical retailers' shops in Manchester should be permitted to remain open on Wednesday afternoons, Mr. G. M. Brewster stated that this matter had been engaging the attention of the Manchester branch of the E.C.A., which had decided to support the move.

The E.D.A. Programme for July

Air conditioning is the subject of a new non-technical booklet issued by the British Electrical Development Association in connection with its sales and publicity programme for July. Attention is also drawn to a brochure entitled "The Truth about the Price of Electricity," which gives the results of a recent survey, and demonstrates in a striking fashion the reduction in the prices for domestic supplies since the previous survey in 1936. Stereos are available for local Press advertisements designed to link up with the current national domestic electrification campaign, and early applications are invited for the E.D.A. processional car, for which a few dates are still free.

The "Exide" Convention

Blackpool accorded a particularly warm welcome to the "Exide" service agents last week on the occasion of their annual convention. This was the third time that the conference had been held at the Lancashire resort, and there was a record attendance. Proceedings opened on Wednesday with a business session, at which several officials of the Chloride Electrical Storage Co., Ltd., read papers on general sales and other problems of particular interest to those who have the handling of Exide products.

The authors of the papers were Messrs. H. Boon, A. C. Stewart, W. Davies, E. C. McKinnon, R. H. Cobham and D. McGregor. In these papers the progress and policy of the company were outlined. At subsequent sessions Mr. Barlow, of Warrington, presided, and the 300 or 400 official delegates had the floor to themselves to say just what they thought and to offer suggestions and proposals which they considered would be helpful to the company and to themselves. In view of the success of the discussions it is probable that at next year's convention three days instead of two will be allocated for the business meetings. On the social side the "high spot" of the convention was the banquet held in the Spanish Hall of the Winter Gardens. In addition to the service agents who came from all parts of the country there were visitors from overseas, mainly Australia, India, New Zealand, France, Belgium and Denmark. Mr. D. P. Dunne presided and made a speech that was entirely felicitous in character; he made no allusion

Service agents and visitors from overseas who attended the banquet at the annual "Exide" convention held at Blackpool

whatever to business topics. The toast of "Exide Service Agents" was proposed by Mr. Grinnel S. Harvey and acknowledged by Mr. R. Darbyshire. The final toast, that of "The Visitors and Press," was submitted by Mr. A. W. Browne, M.I.E.E., and replied to by Mr. R. T. Lewis. Mrs. P. Hennessy (Adelaide) presented the prizes won in the previous day's golf competition, played over the course of the old St. Annes Golf Club.

Safeguarding Supply Companies' Staffs

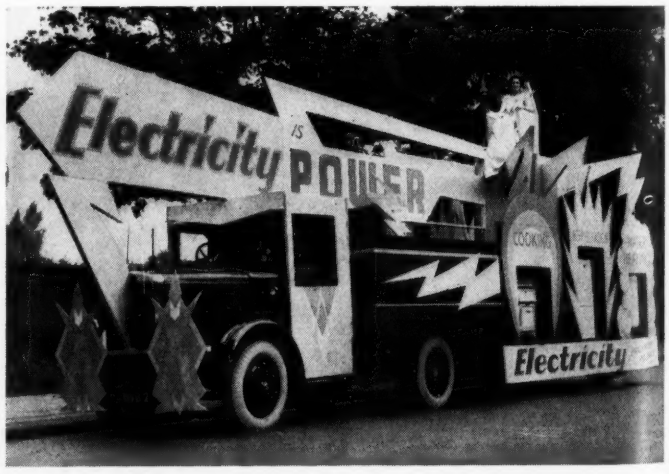
The imminence of legislation affecting the livelihoods of thousands of persons engaged in the distribution of electricity lends especial importance to the activities of an association which, although not so well known as it deserves, has nevertheless been a potent force in protecting its members' interests. Founded in 1919, the Association of Officers and Staff Members of Electricity (Power and Supply) Companies of Great Britain (A.O.E.C.) is not in any way to be regarded as a trade union, nor is it associated with any political body. Explaining its aims, Mr. J. Lesser, the chairman of the executive committee, tells us that its purpose is to ensure that any

Members of the Association of Mining Electrical Engineers during a recent visit to the Whitwood Colliery of Henry Briggs, Son & Co., Ltd., Normanton. In the background are three 1,000-kVA and one 200-kVA Johnson & Phillips' transformers

Government or private Bills placed before Parliament which may have the effect of displacing employés shall contain clauses providing for adequate compensation. This is achieved through Parliamentary agents who watch Bills presented to the House and make any necessary representations to those responsible. Usually this work is done in co-operation with the Electrical Power Engineers' Association and the Incorporated Municipal Electrical Association. As Capt. J. M. Donaldson, the president, remarked in a recent report, the work of the Association is to see that nothing is done to the prejudice of its members, and it can rightly be said that its members have placed themselves in a sound position to meet any assault. Their position would, however, be considerably strengthened if its membership were larger. By a recent revision of the constitution qualification for membership has been reduced from five to one year's service in an electricity company. Clerical staff as well as engineers can join, and the annual subscription of 5s. should not be a deterrent. Further particulars may be obtained from the secretary, Mr. H. S. Mayer, 19, Buckingham Street, W.C.2.

Croydon Carnival

In a recent carnival at Croydon the first prize was awarded to the Corporation Electricity Department's entry. Mr. F. N. Rendell-Baker, the chief engineer and general manager, informs us that this is the third successive year in which the Department has been successful in gaining first prize. On each occasion the carnival van has been one of the Department's own articulated vehicles bearing a tableau which has provided useful electrical propaganda.



The prizewinning display at the recent carnival at Croydon

Power Station Staffs' Salaries

The supplemental schedule of salaries agreed to by the National Joint Board of Employers and Members of Staff for the Electricity Supply Industry in 1935 expires on August 1st and the staff side of the Negotiating Committee recently submitted a proposal that salaries should be stabilised at a figure on the cost of living scale corresponding to eight points deduction below the datum line of the original schedule. The employers were disinclined to agree to this and suggested the continuance of the present rates until the end of the year. They contended that, having regard to the present situation, their constituent undertakers would gravely criticise such increases, which they calculated would cost about £180,000 per annum. The staff side could not agree to this and referred the matter back to the National Executive Council of the E.P.E.A. The Council debated the matter at length and finally decided to support the claims put forward at the Negotiating Committee and that if unsuccessful the staff side should report back for instructions regarding further action.

Training in Electrical Housecraft

An opportunity was given to us last week to see something of the work done by women students at Battersea Polytechnic taking the special course of training in electrical housecraft. Only those who already hold recognised diplomas or certificates in domestic science are eligible for the course, which comprises lectures and practical work dealing with the generation, transmission and distribution of electricity, its utilisation for domestic purposes, and the construction and maintenance of domestic electrical appliances. Training in demonstrating is also provided, students having the use of well-equipped kitchens and demonstration rooms not only at the Polytechnic but also at the headquarters of the Electrical Association for Women in Regent Street. Two of the demonstration rooms at the Polytechnic are specially arranged so that experiments can be carried out with different types and combinations of apparatus. Students are fortunate in that the Electrical Engineering Department is in the same building. They spend eighteen hours a week there and thus receive a very useful and comprehensive grounding from the general electrical engineering point of view. The standard of proficiency required is high and successful candidates are automatically exempted from sitting for the E.A.W. certificate.

Exhibition of Inventions

The Exhibition of Inventions will be held in the Central Hall, Westminster, London, S.W.1, from October 5th to 15th. Inquiries from inventors for the display of new inventions and also for trade space should be addressed to the General Secretary, Institute of Patentees, 10, Victoria Street, Westminster.

Preventing Industrial Eye Injuries

About 10 per cent. of the blind in this country have developed blindness as a result of industrial eye injuries, which at the Royal Eye Hospital, London, alone are responsible for over 7,000 of the 12,000 casualties dealt with every year. This fact is all the more appalling when it is realised that in practically every case the injury was preventable by the use of some simple precaution in the way of machinery guards or goggles. Apparently it is not so much the employers as the operatives who are to blame for not making more use of the protective devices available. They would perhaps take better care of their eyesight if they were to see the gruesome row of glass bottles containing eyes that have

had to be removed at the Royal Eye Hospital. This is only one of the exhibits which the Industrial Eye Injuries Committee of the Hospital has arranged in the form of a permanent exhibition dealing with the prevention of industrial eye injuries which was opened last week by the Earl of Athlone. Several manufacturers have co-operated with the hospital authorities in the display and a series of cases has been prepared showing protection devices recommended for workmen engaged in dusty atmospheres; grinding and milling; welding and furnace work; chipping, hammering and wiring, &c.

Orders Recently Booked

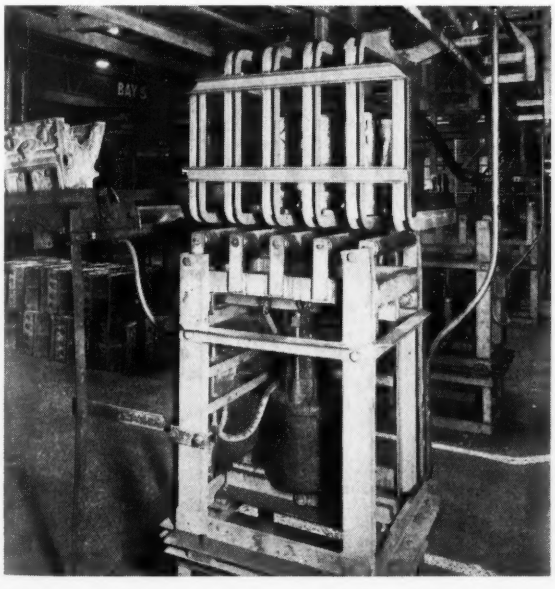
Elliott Brothers (London), Ltd., are supplying the electrical temperature indicating equipment for the world's highest-powered mercantile motor ship, the *Dominion Monarch*. The vessel is being built by Swan, Hunter and Wigham Richardson for the Shaw, Savill and Albion Line, and will be launched on July 27th. The equipment, which is being supplied through J. and E. Hall, Ltd., who are responsible for the refrigerating machinery, is being installed in the provision chambers and refrigerated holds, and consists of over seventy portable-type resistance thermometers with temperature indicators of the three-wire null-point measuring type, combined with multi-way selector switches by means of which all the readings can be obtained at a central position.

Vactric Factory Extensions

A further 4,000 sq. ft. extension to its Cricklewood factory is being made by Vactric, Ltd., at the rear of the present building. The machine shop is being extended and up-to-date machine tools installed.

A Selective Conveyor Installation

In the new Morris car engine factory at Coventry there is a conveyor system, installed by Geo. W. King, Ltd., of Hitchin, which not only conveys the cylinder block castings to the loading station in the pickling shop, but also delivers them automatically to their appointed lines in the machine shop. After pickling, the castings are taken by a roller conveyor to a loading station, where they are placed in special cradles suspended from trolleys and driven by an endless chain into the machine shop. These cradles pass the ends of various gravity roller conveyors serving the lines of machines, and each cradle carries a selecting plate corresponding to the particular station in the machine shop at which it is to be unloaded. At the end of each gravity roller conveyor is a lifting and tilting device embodying a B.T.H. electro-hydraulic thrustor, and when the cradle arrives at its correct station the selector plate connects two electrical contacts and brings the thrustor into operation. The casting is thus lifted from the cradle and tilted on to the roller conveyor, down which it runs by gravity. When the empty cradle passes on, the electrical contacts are broken and the thrustor is released. Each thrustor has an electric motor driving a centrifugal impellor in a closed cylinder containing oil that is pumped from an upper chamber to the under side of a piston, which is forced up by the steady pressure, so raising a frame carrying five rollers which pass between the sections of the cradle and lift the casting. The end of the thrustor stroke tilts the roller

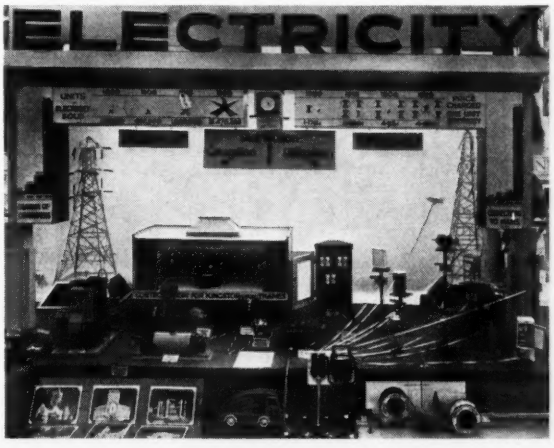


Lifting and tilting device embodying a B.T.H. electro-hydraulic thrustor

so that the casting rolls on to the gravity conveyor. When the motor stops the oil flows back through the stationary impellor and the piston returns to its lowest position.

Kingston Civic Festival

A feature of the Civic Festival which was concluded at Kingston-upon-Thames last week was a display arranged by the Corporation Electricity Department, under the supervision of Mr. E. J. Jarvis, the borough electrical engineer, at the Guildhall. The object of the exhibition was to show the public the various activities and objects of the Corporation's Departments, and the Electricity Department's display illustrated, by means of scale working models, the operation of the Depart-



A display by the Kingston-on-Thames Electricity Department during the recent Civic Festival

ment from the delivery of coal by barge to generation, distribution and utilisation of the electricity. The Department's growth was indicated by illuminated graphs, the lighting for which was operated by a flasher, synchronised to illuminate the symbols for one year at a time.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

	CHEMICALS, ETC.	Price June 29th.	Fortnight's Inc. or dec.
a	Acid Oxalic ... ... per cwt.	50s.	—
a	Ammoniac, Sal ... ... per ton	£36	—
a	Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a	Borax ... ... ,,	£17	—
a	Copper, Sulphate ... ... ,,	£22 10s.	—
a	Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a	,, Perchlorate ... ... ,,	6d.	—
a	Shellac... ... ... per cwt.	£4 18s.	—
a	Sulphur, Commercial ... ... per ton	£11	—
a	,, Roll... ... ... ,,	£11	—
a	Soda, Chlorate ... ... per lb.	3½d. to 3¾d.	—
a	,, Crystals ... ... per ton	£5 to £5 5s.	—
a	Sodium Bichromate, casks ... ... per lb.	4d. net.	—
	METALS, ETC.		
b	Aluminium, Ingots ... ... per ton	£100 to £105	—
b	,, Wire ... ... per lb.	1/1 to 1/9	—
b	,, Sheet and Foil ... ... ,,	1/3 to 2/9	—
p	Babbits Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£179	£25 inc.
	Grade II ... ... ,,	£127	£15 inc.
	Grade III ... ... ,,	£73	£6 inc.
c	Brass (rolled metal 2" to 12" basis) ... per lb.	7⅞d.	¼d. inc.
c	,, Tubes (solid drawn) ... ... ,,	11d. to 11¼d.	¼d. inc.
c	,, Wire, basis ... ... ,,	8d.	¼d. inc.
c	Copper Tubes (solid drawn)... ... ,,	1/0d.	¼d. inc.
g	,, Bars (best selected)... ... per ton	£72	£2 inc.
g	,, Sheet ... ... ,,		
g	,, Rod ... ... ,,		
d	,, (Electrolytic) Bars ... ... ,,	£42 5s.	£2 15s. inc.
d	,, ,, Wire Rods ... ,,	£46 15s.	£2 15s. inc.
d	,, ,, H.C. Wire ... per lb.	7 7/16d.	¼d. inc.
f	Ebonite Rod ½" dia. & up ... ... ,,	1/10 to 2/5	—
f	,, Sheet ⅛" thick & up ... ,,	1/5 to 1/10	—
n	German Silver Wire, Nos. 1 to 12 ... ,,	2/4	—
h	Gutta-percha, fine ... ... ,,	nom.	—
h	India-rubber, Para-fine ... ... ,,	6½d.	¼d. inc.
i	Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s.	—
i	,, Wire galv. No. 1 P.O. Qual. ... ,,	£23	—
g	Lead, English Pig ... ... ,,	£16 10s.	£1 5s. dec.
g	Mercury ... ... per bot.	£13 10s.	—
e	Mica (in original cases) small ... per lb.	10d. to 2/-	—
e	,, ,, ,, medium ... ,,	6/– to 12/6	—
e	,, ,, ,, large ... ,,	13/– to 17/6 up	—
p	Phosphor Bronze, plain castings ... ,,	1/2½	—
p	,, ,, drawn bars & rods ,,	1/0½d.	¼d. inc.
p	,, ,, rolled strip & sheet ,,	10½d.	¼d. inc.
p	,, ,, wire ... ... ,,	1/0½d.	¼d. inc.
o	Platinum ... ... per oz.	£6 12s. 6d.	—
d	Silicium Bronze Wire ... ... per lb.	8 5/8d.	¼d. inc.
g	Spelter ... ... per ton	£13 5s.	17s. 6d. inc.
g	Tin, Block (English)... ... ... ,,	£185 5s.	£15 5s. inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/6	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

Social Events

The annual sports meeting of Callender's Cable & Construction Co., Ltd., was held on June 25th at Belvedere. The continued popularity of these sports among athletes from many clubs was shown by the satisfactory number of entries for the open events (sixty in the men's 220 yd. race, for example). Club members keenly contested their own events, which included a "ramble" for the band and a show of homing pigeons and horticultural show. Sir Tom Callender, Mr. and Mrs. T. O. Callender, Mr. and Mrs. W. G. Hendrey, Mr. E. M. Malek, Mr. H. Foulds and Miss Foulds were amongst those who attended. Mrs. Hendrey presented the prizes at the conclusion of the races. The club's annual dance was held in the evening.

Over fifty members of the former Dick, Kerr Co. gathered at the Holborn Restaurant on June 17th, Mr. Douglas Kerr presiding. Brief speeches were made by Mr. J. L. Burton (English Electric Co., Ltd.), Col. Hardie (Crompton Parkinson, Ltd.), Mr. V. Watlington (B.E.A.M.A.), and Mr. J. E. Calverley (English Electric Co., Ltd.). A resolution was passed that an Association should be formed, and Mr. Kerr was elected permanent chairman. All ex-Dick, Kerr men desiring to join are invited to send subscriptions (5s., life membership) to Mr. R. Briggs, 36, Kingsway, W.C.2. The next dinner will be held at Preston.

Mrs. L. C. Gamage, who presented the prizes at the G.E.C. sports

On June 18th three hundred employés of Bulpitt & Sons, Ltd., went for their annual outing this year to Glasgow. Leaving Birmingham by special train shortly after midnight they reached Glasgow in time for breakfast. A coach tour to Loch Lomond occupied the morning, a visit to the Empire Exhibition following after lunch.

A warm and sunny afternoon greeted the directors and staff of the General Electric Co., Ltd., last Saturday, June 25th, when the annual sports meeting of the G.E.C.'s London establishments was held at the Preston Road Ground, Wembley. Between two and three thousand spectators saw some very keen running, Head Office eventually winning the "Leslie Gamage" Trophy for the leading establishment. Among its individual successes Head Office won the Fire Brigade Competition and ¾-mile relay (London). Representatives of Witton were successful in the 880 yd. flat scratch, 440 yd. flat scratch and the ¾-mile relay. High lights of the meeting were the running of W. E. Luther, a 56-year-old employé of Fraser & Chalmers, who won three prizes, and a very good display by the G.E.C.'s League of Health and Beauty. Another feature was the winning of the mile flat scratch by T. E. Pickering (Head Office) for the fifth year in succession. After the sports a concert was staged in Hirst Hall followed by dancing on the green until 10 o'clock. Prizes were presented by the Hon. Mrs. L. C. Gamage.

Trade Announcements

E. K. Cole, Ltd., have acquired the exclusive rights to manufacture and distribute the products of the Coffield Washer Co., Ltd., of Hamilton, Canada. Products of the Coffield Co. are already well known in this country, having been marketed under the trade names of "Bedal," "Astoria" and "Coffield," and a revised and improved range of washers will shortly be announced under the trade name of "Ekco-Coffield." It is expected that the new types will be available within six weeks.

The Wego Condenser Co., Ltd., has appointed Mr. A. M. Wedderburn, 41, Donegal Place, Belfast, as its agent for Northern Ireland; and Fel-Electric, Ltd., Garden Street, Sheffield, as its agent for Sheffield and the area within a ten-mile radius.

The Mitchell Electric Co., Ltd., has appointed Paterson & Service, of 60, St. George's Place, Glasgow, C.1, as its Scottish representatives for the sale of Mitchell appliances, "Wizard" irons and "Mitchell Crescent" electric heaters, table cookers, &c.

Baxter & Caunter, Ltd., 33-37, Alfred Place, London, W.C.1, have been appointed sole distributors for "Quickfix" chromium reflectors in London and the Home Counties.

New Catalogues and Lists

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, London, W.C.2.—Details of new "Supreme" electric ice-cream freezers.

Partridge Wilson & Co., Ltd., Davenset Works, Leicester.—A leaflet dealing with the new "Davenset Primet" battery charger.

Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.—A folder illustrating "Swan" domestic electrical products.

Dorman & Smith, Ltd., Ordsal Electrical Works, Salford, Manchester, 5.—Details of the "Lancastrian" iron-clad switches and switch units.

Lancashire Dynamo & Crypto, Ltd., Trafford Park, Manchester.—A pamphlet dealing with mica used in the manufacture of electric motors.

British Insulated Cables, Ltd., Prescot.—Leaflets on tramway and trolley-bus line fittings and braided aerial cable and wires.

Union Lamp & Lighting Co., Ltd., Abbeydale Road, Wembley.—Details of high-wattage lamps.

Klaxon, Ltd., 201, Holland Park Avenue, London, W.11.—A brochure giving particulars of models from the range of warning signals.

"Beeantee" Illuminations, Ltd., 88, Goswell Road, London, E.C.1.—Leaflets describing festoon lighting and strip lighting equipments.

Siemens Electric Lamps & Supplies, Ltd., 38/39, Upper Thames Street, London, E.C.4.—A new publication dealing with service and power fuse boxes.

Bankruptcy Proceedings

J. F. B. Wallen (Auto Radio Co.), radio dealer, 191, Elgin Terrace, Maida Vale.—This debtor attended the London Bankruptcy Court last week for public examination before Mr. Registrar Parton. The statement of affairs showed liabilities of £1,812 and assets of £10. The debtor stated that his business was mainly that of supplying and fitting car radio sets for the trade. He attributed his failure to loss by burglary, heavy advertising and other expenses, lack of trade and to a liability to his wife under a separation order. The examination was adjourned for the debtor to furnish further accounts.

L. A. W. Steinmetz, electrical dealer, 56, Bromham Road, Bedford.—Order made May 25th suspending discharge for two months until July 25th.

H. W. Fletcher, wireless dealer, 233, Normanton Road, Derby.—Trustee, Mr. A. J. Rogers, Official Receiver, 22, Regent Street, Park Row, Nottingham, released June 9th.

L. C. Rowse, radio and electrical engineer, 20, Western Place, Penryn, Cornwall, formerly carrying on business at 60, Lower Market Street, Penryn.—Trustee, Mr. G. C. Hancock, Official Receiver, 12, Princes Street, Truro, released June 9th.

A. E. Barrow, formerly wireless and electrical dealer, 95, Swaine House Road, Five Lane Ends, Bradford, lately carrying on business at 217, Huddersfield Road, Low Moor.—Last day for receiving proofs for dividend July 6th. Trustee, Mr. W. F. Cresswell, Official Receiver, 71, Manningham Lane, Bradford.

W. N. Smith, radio dealer, 18, King Street, Dudley.—Receiving order made June 20th on debtor's own petition.

F. E. Walton, electrical engineer, Island Hotel, Eel Pie Island, Twickenham.—Last day for receiving proofs for dividend, July 9th. Trustee, Mr. J. L. Poland, 29, Russell Square, W.C.1, Official Receiver.

Company Liquidations

Farr's Electric, Ltd., radio and television dealers, Jubilee Parade, Greenford.—The statutory first meetings of creditors and shareholders under the compulsory liquidation of this company were held last week at the Board of Trade Offices, Carey Street, W.C. Mr. J. Barwick Thompson, Official Receiver, reported that no accounts had been lodged and he had very little information regarding the company's affairs. It was incorporated in December, 1937, with Thos. George Farr, known as Tommy Farr, the boxer, and Samuel Cyril Green, acting as directors. The failure of the company was attributed mainly to loss of credit due to the reluctance of traders to do business after they became aware of the company's instability. Other causes of failure advanced were mismanagement and lack of capital. A resolution was passed for the appointment of Mr. Charles Latham as liquidator, with a committee of inspection.

Phœnix Battery Co., Ltd.—Liquidator, Mr. E. T. A. Phillips, Senior Official Receiver and Liquidator, 33, Carey Street, Lincoln's Inn, W.C.2, released June 10th.

Eves Radio, Ltd.—Particulars of claims by July 11th to the liquidator, Mr. E. Cox, 93, Tettenhall Road, Wolverhampton.

Private Arrangement

Radio Engineers, Ltd., 21-23, Otley Road, Bradford.—A meeting of the creditors was held recently, when a statement of affairs was submitted which showed liabilities of £688. The assets were estimated to realise £202, or a deficiency, as regarded the creditors, of £486. So far as the shareholders were concerned there was a deficiency of £527, which was attributed to losses on the trading and the depreciation written off the assets. The meeting, it was pointed out, was an informal one and was not being held under the provisions of the Companies Act. An offer was submitted of a composition of 5s. in the £, payable over twelve months and guaranteed. After some discussion it was decided to accept the offer payable as to 2s. 6d. on October 1st next and the balance on January 1st, 1939.

Dissolutions of Partnership

The Maidstone Electric Welding Co., electric and oxy-acetylene welders, Queen Anne Road, Maidstone.—Messrs. J. A. Robertson and W. D. Vanson have dissolved partnership. Both of the partners will attend to debts, and the business will be carried on in the future by the Armstrong Manufacturing Co., Ltd.

Reading Battery Service, radio and electrical engineers, 205, Oxford Street, Reading, and 46, George Street, Caversham, Reading.—Messrs. F. R. Edgington and H. D. Morgan have dissolved partnership. Mr. Morgan will attend to debts and carry on the business at 46, George Street, Caversham, Reading.

Electricity Supply

Lighting, Domestic, Power

Addington.—EXTENSIONS.—The County of London Electric Supply Co. is to extend its mains to supply 33 houses in Eversley Way, and 152 new flats in Wickham Road, at a cost of £2,279.

Alnwick.—PROPOSED SUB-STATION.—The North-Eastern Electric Supply Co., Ltd., is to purchase a sub-station site in the Pottergate clearance area.

Argentina.—INCREASED ELECTRICITY OUTPUT.—During 1937 the Italo-Argentine Electric Co. generated 308.1 million kWh, an increase of 23 per cent. over 1936. The total number of services connected at the end of the year was 112,554, an increase of 4,663.

Banstead.—SCHOOL INSTALLATION.—An estimate of £5,750, for the installation of electric lighting and an electric fire alarm system at the residential school, has been approved by the London County Council Education Committee.

Barnes.—SUPPLY TO SANATORIUM.—The borough electrical engineer is to place orders for the necessary equipment in connection with a supply of electricity to the new Mortlake Sanatorium as soon as instructions are given by the Sanatorium Board.

CHANGE-OVER.—It is reported that the laying of new mains required in connection with the change-over in the Kew area has been commenced.

Brighton.—SUB-STATION CONSTRUCTION.—The Town Council is to apply to the Electricity Commissioners for sanction to borrow £3,110 towards the cost of a sub-station site, building, equipment, &c., at Carden Avenue. The remaining £1,643 for h.v. and l.v. cables, &c., is to be taken from the £100,000 loan for mains and services. Other sub-stations are to be erected by the Electricity Department at Beechwood Avenue (Patcham) and 48, Cheapside.

Calne.—REDUCED TARIFF.—The Town Council has reduced the two-part tariff "unit" charge from 1½d. to 1d. per kWh as from June 30th.

Dundee.—NO COMPENSATION FOR TENANTS.—A sub-committee of the Housing Committee has decided that no compensation shall be paid to tenants of Corporation houses who have installed electricity at their own expense.

Easington.—STREET LIGHTING.—The Parish Council is to apply to the Ministry of Health and the Durham County Council for sanction to borrow £2,000 for street lighting improvements.

Fareham.—ELECTRIC LIGHTING.—The Urban District Council is to install sodium electric-discharge lamps along the High Street to Cams Hill.

France.—MORE WATER HEATERS INSTALLED.—Recent statistics give the number of electric water heaters installed in France and in North Africa as 67,536, of which 26,594 are in Paris, 37,679 in the provinces, and the remaining 3,263 in North Africa. Heaters with a capacity of from 13 to 22 gal. number 27,204, while in the sizes between 25 and 40 gal. there are 21,164. It is pointed out that the very small sizes of about 1 to 5 gal. capacity are not all included in the figures, as many people buy these and connect them to their electrical installation without declaring them to the supply undertaking. In spite of this, 5,225 of these small sizes are included in the total. Among the largest sizes there are two of 2,200 gal. capacity and five between 1,320 and 1,980 gal.

Heywood.—EXTENSION.—A supply of electricity is to be given to Birtle Bleach Works, for Oliver Ormrod, Ltd.

Isle of Man.—A BURNT POLE.—During a recent gale the wind velocity, touching 70 m.p.h., broke one of the binders of an overhead line and the phase wire apparently made contact with the wooden pole before earthing on the arm. As a result the pole top was ignited, and smouldered for some two hours, with the result shown in the accompanying photograph sent to us by Mr. V. A. F. Bellamy, engineer and secretary to the I.O.M. Electricity Board.

The burnt pole of an overhead line on the Isle of Man

India.—ELECTRIFICATION IN BIHAR.—The Legislature has now adopted the grid electrification scheme prepared by the Bihar Government and has appointed a special committee to co-operate with Government in carrying it out. Electricity will be generated from coal. It is stated that the cost per kW of installed capacity will be the lowest in India—from Rs.400 to Rs.500. The Punjab scheme has cost over Rs.3,000 per kW, the U.P. scheme Rs.1,208, the Madras scheme Rs.683, and the new Papanasam scheme will cost Rs.860 per kW. It is understood that the Bihar project contemplates the generation of electricity not from the direct burning of coal, but from gas produced by low-temperature carbonisation of the coal, yielding tar, pitch, creosote oil, &c., as by-products.

Liverpool.—SUB-STATION.—The Electricity Department is to erect a sub-station in Huyton Hey Road, Huyton.

London.—J.E.A. MAINS EXTENSIONS.—The London & Home Counties Joint Electricity Authority has approved mains extensions, services, &c., costing £15,426.

According to the *Financial Times*, the J.E.A., yielding to the wishes of the Electricity Commissioners, has agreed to revise its estimates so as to secure that the results of the undertaking in the year 1940 shall not show a loss. Hitherto the authority has insisted that equilibrium should be achieved only by the end of 1942. The Commissioners have given the Authority until the end of 1943 to arrange its finances so that the receipts on income account shall be sufficient to cover expenditure on income account (including interest and sinking fund charges), together with all accumulated deficiencies. An increase of prices to consumers may be the only method by which the Authority can comply with the Commissioners' wishes. The Finance Committee is preparing a report on the matter.

HAMMERSMITH.—In October, 1936, the Council approved proposals for affording a supply of electricity to the tenements of the Cleverly estate of the Peabody Donation Fund. This scheme is virtually completed, and the consent of the Peabody Donation Fund has now been obtained to a similar scheme in respect of its Hammersmith estate, which comprises 284 flats and 33 cottages. The trustees have agreed to provide the requisite sub-station building, and it is proposed that the Council shall afford a high-voltage supply directly from the generating station. In addition, the Council will equip the sub-station building with transformers and switchgear, lay low-voltage cables and service mains throughout the estate, and install rising mains in each building of sufficient capacity to afford supplies for cooking, heating and lighting. The total estimated cost is £4,151.

Provision is made in the annual estimates for 1938-39 for the improvement of the lighting in the main thoroughfares of the borough by the installation of mercury electric-discharge lamps. The Works Committee now recommends that the proposed improvement in the lighting of the main thoroughfares in the borough shall be proceeded with at a total estimated cost, including services, &c., of £14,154; that the Council shall enter into the requisite contract with the General Electric Co., Ltd., for the supply of the necessary apparatus; and that the tender of Electrical Installations, Ltd., for erecting and assembling the apparatus (£1,741) shall be accepted.

LEWISHAM.—The L.C.C. Education Committee is to install electric lighting at Durham Hill school.

POPLAR.—The experimental provision of kettles for consumers who have not the facilities for installing either a water heater or wash boiler has proved very successful, and the Electricity Committee considers that the scheme should now be extended to all such consumers. In the first place 5,000 kettles will be required and it is proposed to place an order with Messrs. N. C. Joseph, Ltd.

ST. PANCRAS.—The Highways Committee reports that the Central Electricity Board has given one month's notice of its intention to lay cables from the borough boundary at York Way to the boundary of the Crown Lands estate at Chester Gate, in connection with the South-east England Electricity Scheme cable route, Lodge Road to Islington. The Board has also forwarded particulars of the manner in which its consulting engineers, Messrs. Merz and McLellan, propose to carry the cables across the canal at the bridge in King's Road. The Committee is raising no objection to the scheme.

The Electricity and Public Lighting Committee has given further consideration to the question of improvements in street lighting throughout the borough, the paragraph on which was withdrawn at the May meeting of the Council. The chief electrical engineer and manager has submitted a comprehensive schedule showing those streets in which improvements in the lighting have not already been executed or sanctioned; the existing lighting therein; proposals for lighting these streets with electric-discharge lamps; and the estimated cost of carrying out the proposals. The schedule contains 584 streets with a total mileage of 72. The cost involved, including the laying of the necessary mains and services, is £176,489. The Committee recommends the Council to agree in principle with proceeding with improvements in the street lighting on the basis indicated in the schedule.

Morecambe.—SUB-STATIONS.—The Electricity Committee has acquired sites in Knowlys Road and Seymour Grove for the erection of sub-stations.

Newbury.—CHANGE-OVER.—In view of the abnormal increase in the number of consumers throughout the borough and in order to eliminate the possibility of the existing system becoming overloaded, the remaining d.c. supply is to be

changed over to a.c. at an early date by the Wessex Electricity Co.

Northants.—INSTITUTION LIGHTING.—The Wellingborough Electric Supply Co., Ltd., is to install electric lighting at the Wellingborough Public Assistance Institution (£186), and tenders are to be invited for an electric lighting installation at Oundle Institution.

Northallerton.—TOWN PLANNING SCHEME INQUIRY.—When an inquiry was held last week by an inspector of the Ministry of Health into a town planning scheme proposed by the North Riding County Council for the Aysgarth, Bedale and Masham area, Mr. Paley Scott, K.C., and Dr. Charlesworth objected on behalf of the North-Eastern Electric Supply Co., Ltd., on the grounds that the scheme would impede the company's progress. Mr. Scott said that the company supplied electricity over a very large area covered by the town planning scheme. It had done a great deal to bring power to small villages and it was very important that energy should be supplied at the lowest possible cost. Without care in planning it was most difficult to carry electricity to these areas. Where cables had to be laid underground it was essential that the company should have as direct a route as possible, and it was also desirable that it should have access overground. Mr. Scott stated that if the present scheme were approved the company might not be permitted to continue to use land scheduled as open spaces for the erection of poles, &c. He suggested that a clause should be inserted to protect its interests. The inspector noted the arguments.

Oundle.—PUMPING PLANT.—A tender for new pumping plant, for which Rushden Electric Supply Co. is to install wiring, has been accepted by the Urban District Council.

Padiham.—ADDITIONAL FEEDERS.—The Lancashire Electric Power Co. has informed the Electricity Committee that additional feeders are required to supplement those from the sub-station to Burnley Road and Church Street, which are loaded to their full capacity. The provision of these has been approved in principle by the Committee.

Portsmouth.—PROPOSED SUB-STATION.—The Electricity Committee has obtained a site for a sub-station in Wade Court, Havant.

Preston.—STREET LIGHTING.—The Corporation has put forward a new street lighting scheme estimated to cost £4,000.

Ramsey.—ELECTRIC STREET LIGHTING.—By the chairman's casting vote, the Urban District Council has decided that the proposed new street lighting installation shall be by electricity.

Runcorn.—NATIONAL PETITION NOT SUPPORTED.—The Runcorn and District Chamber of Commerce has decided not to support the national petition of the Electricity Consumers' Association, which contends that there should be compulsory amalgamation of many of the smaller undertakings, the compulsory adoption of a standardised two-part tariff with statutory maximum "unit" charge, compulsory adoption of the standard voltage of 230, the abolition of meter rents, and other matters. One member declared that the Consumers' Association overstated the case when it spoke of chaos, the fact being that the industry had suffered far too much Parliamentary legislation in the past. The Chamber of Commerce, however, agreed that compulsory adoption of a standard voltage was desirable.

Siam.—SUPPLY PROGRESS.—The report for 1937 of the Siam Electric Corporation, Ltd., shows that at the end of last year the undertaking was supplying power to 30,712 consumers as compared with only 27,873 at the end of 1936. During the twelve months the load on the power station increased from 18,422 to 19,353 kW.

Tasmania.—COMMISSION'S REPORT.—The Hydro-electric Commission (Messrs. W. E. Maclean, C. B. Davies and J. E. Heritage) report that the results achieved during the year ended June 30th, 1937, provide ample grounds for gratification. The output of electrical energy was increased by 6 per cent. to 462.9 million kWh, and the revenue from the sales (£461,879) was the highest recorded. The difficulties which the Commission had to face in accelerating its construction programme were, however, accentuated by the prevailing prosperity of the Commonwealth and the greatly increased manufacturing activity in Europe (particularly in England) resulting from rapid re-armament. It was found impossible to secure the services of suitable additional engineers and draughtsmen. In Hobart, all contractors for electrical installations were busily engaged throughout the year as a result of marked activity in the building trades, and at the end of the period under review there was every indication of further expansion in that direc-

Municipal Progress in 1937-38

Leeds

AN additional 6,339 consumers were obtained by the Leeds Electricity Department during the past year, at the end of which the total number was 154,533. An analysis in the report of Mr. C. Nelson Hefford, the general manager and city electrical engineer, shows that those supplied under the residential two-part tariff again increased largely in number (by 11,430 to 66,330), and due to transfers to this tariff the number of consumers taking ordinary lighting supplies decreased by 5,379 to 75,140, although it is noteworthy that the total capacity of their installations was actually higher than a year ago. Excluding supplies to the C.E.B., sales of energy amounted to 259.0 million kWh, an increase of 11.2 million kWh, or nearly 5 per cent. Residential two-part tariff supplies rose by 4.8 million kWh (10 per cent.), to 54.3 million kWh, and power and bulk supplies by 3.3 million kWh (3 per cent.) to 108.3 million kWh. An improvement of 23 per cent. to 1.5 million kWh in street lighting supplies is notable, while despite the smaller number of consumers private lighting consumption rose by 3 per cent. to 41.0 million kWh. There were also increases in supplies for heating, traction, and in bulk to other undertakings. Taking the population of the city as 491,880 and omitting the consumptions for traction, street lighting, and bulk supplies outside the Department's area, the output is equivalent to a consumption of 434 kWh per head, as compared with 415 per head in the previous year, based on a population of 489,800.

Satisfactory Financial Position

The total income of the Department shows another substantial increase (from £1,020,448 to £1,099,090). The net profit on the year's working, after deducting £258,583 for reduction of loan debt, is £90,941, compared with £112,411 in 1936-37. From this profit the sum of £63,346 has been absorbed as a contribution to the capital expenditure of the year, leaving a surplus profit of £27,145, compared with £62,456 in the previous year. Owing to the complete figures not being available, the revenue and kWh sold have had to be estimated. The policy of providing all showroom and hire department expenditure out of revenue was continued. The revenue from rental of apparatus on hire amounted to £6,118, compared with £5,956 during the previous year. Apparatus to the value of £41,395 was sold on hire-purchase terms, compared with £35,499 during the previous year, and the amount outstanding on this account at March 31st was £46,531. The popularity of the assisted wiring scheme has been maintained, the number of consumers connected to the mains at March 31st being 58,145, while the number of applicants awaiting connection was 157.

The simultaneous m.d. of the Whitehall Road and Kirkstall power stations, which were operated in parallel on the three-shift system, was 126,120 kW, against 110,140 kW in the previous year. At Whitehall Road 121.5 million kWh was generated, with a coal consumption of 2.271 lb. (0.175d.) per kWh, whereas at Kirkstall 312.7 million kWh was generated with a coal consumption of 1.318 lb. (0.099d.) per kWh. On the basis of 382.4 million kWh sold, coal cost 0.153d. per kWh, against 0.134d. on 330.7 million kWh in the previous year, but nevertheless the total cost of production per kWh sold was slightly less than previously (0.620d. against 0.645d.).

The total length of mains now amounts to 2,903 miles, an increase of 171 miles, and the number of sub-stations and kiosks constructed and equipped to 438, an increase of 29. The 33-kV mains to increase the capacity of the connection between the Kirkstall and Whitehall Road generating stations have now been laid and the switch-houses in connection therewith are in process of erection. The staff of the undertaking at March 31st last numbered 1,415.

Belfast

The report of Mr. F. H. Whysall, city electrical engineer and general manager at Belfast, shows that the past year's operations of the Electricity Department were marked by a further large increase in general power supplies. These rose by 7 million kWh (15 per cent.) to 54.9 million kWh, following the 14 per cent. expansion in 1936-37. In addition, supplies to shipyards recovered to 22.4 million kWh after falling from 23.8 to 20.4 million kWh. Total sales rose by 16.4 million kWh (10 per cent.) to 178.6 million kWh, but excluding traction supplies (some 23 million kWh in each year) the development was of the order of 12 per cent. Domestic electricity consumption showed a satisfactory improvement (11 per cent. to 24 million kWh) and this rate is likely to be increased in the future by the institution of hire and hire-purchase schemes for water heaters and the offering for hire of a greater variety of cooking equipment. The number of consumers connected increased by 8,870 to 67,567 and the total connections, excluding transport, rose by 12,817 kW to 172,172 kW.

Distribution work carried out during the year included the laying of 66 miles of high-voltage and low-voltage cables, the erection of six miles of overhead lines and the construction of 50 miles of service mains. Reviewing various schemes in hand during the year, the report states that the work of providing duplicate transformers at each of the 33-kV primary transmission step-down sub-stations is nearing completion, thus making these sub-stations independent of the 6.6 kV city cable network. The changing of consumers' supplies from d.c. to a.c. is being continued in order to relieve the load on converting machinery and d.c. mains. In addition, where economically possible, a.c. networks are being superimposed in d.c. areas. The Police Committee has placed orders with the Department for lighting the main by-pass roads. Financially, the results of the year's working are also highly satisfactory. Despite a rise of 11 per cent. in the cost of coal there is a net surplus of £86,676 against £63,545 in the previous year. The gross profit was £351,800, revenue rising by £72,432 to £704,242 and working costs by £45,341 to £352,442. From the net surplus £16,500 has been contributed to rate relief.

tion, with a consequent promise of continued electrical development in lighting, cooking, and water-heating. The increasing popularity of electric cooking was demonstrated by the sales of electric ranges. With the co-operation of the City Council and many leading business firms, the principal streets were brilliantly illuminated and extensions of the present well-lighted area are likely to follow. The number of consumers being supplied by the Country Districts Branch at June 30th, 1937, was 12,391, an increase of 2,627 (1,492 were acquired by the transfer of the Devonport Council's undertaking to the Commission). The construction of 121 miles of overhead lines was necessary in connection with extensions of the supply, and investigations were made with a view to a number of further extensions. Electric soil-heating cables have proved to be a commercial proposition for the raising of tobacco plants, and continued progress has been made in the use of electricity for irrigation purposes. During the year the Commission sold energy in bulk as follows (million kWh): Electrolytic Zinc Co., 285.8; Australian Commonwealth Carbide Co., 38.0; Hobart District, 35.8; Country Districts Branch, 27.8; Launceston City Council, 15.6; and Goliath Portland Cement Co., 7.0.

Rutherglen.—LIGHTED BEACONS.—The success of an experiment in the lighting of Belisha beacons has encouraged the Town Council to proceed with an extension of the idea to other crossings.

Thornton Cleveleys.—BULK SUPPLY.—The Blackpool Corporation proposes to afford a bulk supply of electricity to the Urban District Council.

Traction

France.—PARIS UNDERGROUND.—A report on the operation of the Paris underground electric railways during 1937 states that the length of the urban and suburban lines increased from about 90 to 99 miles. During the period 60 of the old wooden coaches were replaced by all-steel vehicles, and at the end of the year the rolling stock comprised 1,398 motor-equipped coaches, 1,383 trailing carriages and seven goods locomotives, a total of 2,788 units. A new sub-station was opened at the Porte de Versailles and three new sub-stations were completed to supply power to the extended lines at Neuilly, Levallois and Montreuil. Including those for the Sceaux line, the company has now twenty-nine sub-stations in operation, with a total installed capacity of 177,980 kW. Considerable attention was devoted during the year to the improvement of the train signalling equipment and to the lighting of the stations, new 200-V installations which give better lighting without any marked increase in consumption having been completed at twenty-five stations. Passenger-journeys numbered 840.6 millions as compared with 815.5 millions in 1936.

London.—IMPROVED TUBE TRAINS.—The first seven of the 1,066 tube trains of improved design ordered by the London Passenger Transport Board were given a trial run as a train between Golders Green and Edgware stations on Monday. By placing all the driving equipment beneath the floor it has been possible to increase the passenger-carrying capacity by 12½ per cent. compared with the older stock. Improved acceleration will enable the number of trains per hour to be increased from 40 to 48 without raising the maximum speed. The system of braking includes the use of a mercury switch retarder by means of which high initial pressures are fed to the brake cylinders at the commencement of braking and the danger of wheel pick-up at lower speeds is avoided by automatic reduction.

NEW SUB-STATIONS.—The London Passenger Transport Board has placed a £296,000 contract with the General Electric Co., Ltd., for the supply of electrical equipment for twelve sub-stations for the North-East London railway extension scheme. The announcement is of special interest to electrical engineers because the equipment is of a type never before used in this country. The rectifiers will be 12-phase (four rectifying units coupled into one large unit), made of steel and requiring neither water-cooling nor vacuum pumps. The 12-phase connection reduces the ripple to an amount equal to that of a rotary convertor—to below a 13th harmonic.

Northern Ireland.—NEW BELFAST TRAFFIC SIGNALS.—Traffic in Belfast's busiest area—Castle Place—is to be controlled by an extensive system of vehicle-actuated traffic signals. Five road intersections are affected. At four of the five road junctions there are pedestrian signals controlled by push-buttons, and an "all red" period for traffic precedes the pedestrian interval in each instance. From a purely vehicle-control viewpoint the installation is of particular interest because of the heavy volume of tramcar traffic. Tram tracks actually lie throughout the whole of the area. Included in the scheme is a facility termed "Electro-matic repeat detector impulsing," the function of which is to "repeat" to the signal controller at the next intersection the impulses received by the controller at the preceding intersection as a result of a vehicle crossing the road detector pad. This "advance notice" enables the control at each subsequent intersection to be adjusted so that through traffic is allowed to flow with the minimum of interruption. This facility is superimposed upon the individual control at each intersection and is in addition to the flexible progressive system of linking imposed by the master timer. The signals have been manufactured and installed by the Automatic Telephone & Electric Co., Ltd., in conjunction with the city electrical engineer.

Communications

Germany.—TELEVISION.—The standards have now been published for the television service which is to commence in August. The main characteristics are as follows: 441 line definition and twenty-five frames interlace scanning, giving fifty frames of 220.5 lines per second. Transmitters at Berlin and the Feldberg in Taunus will operate on the same wavelengths, namely 6.6 metres for sound and 6.28 metres for vision. The Brocken transmitter will operate on 7.5 metres for sound and 7.28 for vision. This leaves space for another station in the band allotted. The frequency breadth of modulation is 2 megacycles. "Positive" modulation will be employed, producing white at the maximum and black near the minimum. An under-black area has been provided for the transmission of the synchronisation impulses. The average brightness of the image, d.c. component, will also be transmitted. In the transmitter a carrier frequency of 8 mc. will be used for the modulation. It is suggested that this frequency would also be suitable for the i.f. stages of the receivers. Separation of sound and vision wave in every case is 2.8 mc. For cable relays the carrier frequency will be 3.969 mc. one-side-band and, possibly, suppressed carrier. This will also be used in wired television distribution systems.

Great Britain.—RADIO INTERFERENCE BY NEON SIGNS.—The Works Sub-Committee of the Metropolitan Boroughs' Standing Joint Committee, at the request of the Paddington Borough Council, is ascertaining the views of the constituent Councils on the desirability of asking the London County Council to seek Parliamentary powers to enable them, as a condition of consent in respect of the installation of neon signs, to impose a requirement that applicants must fix a device thereto for the purpose of preventing interference with radio receiving apparatus in the vicinity.

India.—RADIO IN MADRAS.—A new broadcasting station was opened in Madras on June 16th, and as part of the scheme the Government of Madras is establishing village receivers over a large area. It is proposed to supply these receivers in districts as far as 300 miles away from Madras and to provide a service to them from the short-wave station. The result of this experiment will be watched with great interest, as only by the use of short-wave services can villages at such distances be served. Similar developments in other presidencies will follow the success of the Madras experiment. The Madras broadcasting centre comprises a studio and two transmitters, one of 10 kW (short-wave) at Guindy, six miles south of the city, and another of 0.25 kW (medium wave) at the studio building.

Japan.—TELEPHONE LINK WITH CHILE.—A direct radio-telephone service between Tokyo and Santiago (Chile) has been inaugurated. A three-minute call costs 100 yen (about £6).—*Reuter* (Tokyo).

The L.J.E.A. and Loans for Apparatus

SHOULD the repayment period of a loan for consumers' electrical apparatus be extended beyond the existing period of seven years rather than raise the hire charge of apparatus? This is the problem that the Electricity Commissioners are having to decide in connection with an application for a loan of £87,000 by the London and Home Counties Joint Electricity Authority.

In a recent communication the Commissioners stated that they had not received any representations from either the British Electrical Development Association or the Incorporated Municipal Electrical Association in favour of extended periods of loan repayment, but that, if an extended period were granted, it would be applicable only to future expenditure. As the application, however, included sums expended in anticipation of loan sanction they suggested that the Authority might desire to deal forthwith with that part of the application relating to expenditure already incurred, or likely to be incurred in the near future. If so, the Commissioners requested that the Authority would indicate the total loan required immediately.

In response the Authority says that the views of the E.D.A. and I.M.E.A. are that the repayment of loans for cookers and storage and immersion heaters should be extended from seven to ten and fifteen years. Furthermore, it states that, until the question has been considered and decided by the Commissioners, it must cease further capital expenditure on apparatus for hire. The hope is expressed that the Commissioners will see their way to give effect to any revision of loan sanction period as from January 1st last.

In the Authority's opinion there would be no need at present to increase the tariffs at which the Authority distributes electricity were it not for the unduly short term for redeeming capital expenditure. The authority is, however, to take steps in the preparation of the estimates for 1939 and 1940 to comply with the Commissioners' wishes.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Alton.—July 14th. U.D.C. One 45-b.h.p. electric motor and starter. (See this issue.)

Argentina.—BUENOS AIRES.—August 22nd. National Sanitation Works Department. Six electric pumping sets, accessories and spares. (T.Y. 23107/38.)*
July 20th. One electric generating set. (T.Y. 23358/38.)*

Berwickshire.—July 18th. County Council. Electrical installation at new central school, Chirnside. R. Wood, director of education, County Offices, Duns.

Bexhill.—July 5th. Electricity Department. Meter-testing equipment and instruments. (June 24th.)

Birmingham.—July 25th. Electric Supply Department. Domestic electrical apparatus for twelve months. (See this issue.)

Blairgowrie and Rattray.—July 11th. Town Council. Electric lighting installations in fifty-six houses. W. D. M. Falconer, burgh surveyor, Wellmeadow (deposit £1 1s.).

Bognor Regis.—July 11th. U.D.C. Electric lighting installations at Rose Green Road and Gossamer Lane. (See this issue.)

Bridport.—July 13th. Electricity Department. 6,600-V overhead lines, together with a section of 230/400-V lines. (June 24th.)

Bristol.—July 11th. Electricity Department. 6,600-V transformer and l.v. feeder voltage regulators. (June 24th.)

Cardiff.—July 12th. Education Department. Electrical installation at Colchester Avenue High School for Girls. City electrical engineer, The Hayes (deposit £1 1s.).

Dewsbury.—July 5th. Electricity Undertaking. One l.v. three-phase sub-station distribution board. (June 24th.)

Dublin.—August 6th. Electricity Supply Board. Four 15,000-kVA transformers with on-load tap-changing equipment. (June 24th.)

Egypt.—CAIRO.—July 16th. Ministry of Public Health. 300 electricity meters. (T.Y. 23368/1938.)*

Erith.—July 11th. Electricity Department. Laying and jointing of h.v. and l.v. cables. (See this issue.)

Exeter.—July 5th. Electricity Department. Fourteen transformers. (June 17th.)

Felixstowe.—July 22nd. Electricity Department. Four metal-clad, 11,000-V switchgear units. (See this issue.)

Fife.—July 12th. Education Committee. Electrical installations at eleven schools, schoolhouses, &c. G. Sandilands, county master of works, County Offices, Kirkcaldy (deposit £1 1s.).

Finchley.—July 25th. Electricity Department. Immersion heaters and circulators and cooking utensils for twelve months; wrought iron brackets for street lighting fittings and control equipment for mercury discharge lighting. (See this issue.)

Glasgow.—July 11th. Corporation. Electrical installation at Temple police office garage. Town Clerk.

Heston and Isleworth.—July 5th. Electricity Department. One 600-kVA transformer and e.h.v. and l.v. cable. (June 24th.)

Horsham.—July 4th. Electricity Department. One steel kiosk transformer sub-station. (June 24th.)

Lochgelly (FIFE).—July 11th. Town Council. Electric lighting of 112 houses. Town Clerk (deposit £1 1s.).

London.—BATTERSEA.—July 1st. Borough Council. One electric lift. Borough surveyor, Town Hall, Lavender Hill.
HAMMERSMITH.—July 4th. Electricity Department. E.h.v. metal-clad switchgear. (June 24th.)
FINSBURY.—July 13th. Borough Council. Installation of electric lighting equipment at Bull Stairs Wharf Depot. (See this issue.)
ST. PANCRAS.—July 14th. Electricity Department. P.i. lead-covered cables, meter boards, cooking stoves, fires, washboilers and water heaters for twelve months. (See this issue.)

Manchester.—July 11th. Electricity Department. One mercury-arc rectifier. (See this issue.)

Middlesbrough.—July 8th. Electricity Department. Cables for twelve months. (See this issue.)

Newcastle-under-Lyme.—July 19th. Highways Committee. 280 lamps, lanterns, fittings and columns for street lighting within the borough. (June 24th.)

New Zealand.—CHRISTCHURCH.—August 4th. Electricity Department. Fifteen 200-kVA single-phase transformers. (T.Y. 23251/38.)*

Nuneaton.—July 6th. Electricity Department. One kiosk sub-station, complete with e.h.v. and l.v. switchgear and one 300-kVA transformer. (June 24th.)

Portsmouth.—July 19th. Electricity Undertaking. One 37,500-kVA three-phase transformer. (See this issue.)

Rothbury.—R.D.C. Electrical wiring of thirty houses. Hetherington and Wilson, 27, Bondgate Without, Alnwick.

Roxburgh.—July 8th. County Council. Heating and electrical installation at Newtown St. Boswells school. County Clerk, Newtown St. Boswells (deposit 10s. 6d.).

South Africa.—PRETORIA.—July 7th. Union Tender and Supplies Board. One 50-h.p. squirrel-cage motor and one a.c. portable welding set. (T.Y. 22931/38.)*
July 14th. Public Works Department. Apparatus for an electric clock system. (T. 23183/38.)*
July 21st. One 75-kVA transformer, one h.v. switch and 1,000 ft. of cable. (T.Y. 23459/38.)*
JOHANNESBURG.—July 19th. City Council. One testing transformer and three 75-kVA transformers. (T.Y. 23068/38.)*
BRAKPAN.—July 15th. Town Council. Sewage disposal plant, including electric motors. (T. 23461/38.)*
CAPE TOWN.—July 20th. Electricity Undertaking. 3,500 yd. each of e.h.v. and pilot cable. (T.Y. 23649/1938).*
July 20th. Electricity Supply Commission. Pin type and suspension strain insulators. (T. 23650/38.)* Electric light poles and fittings. (T. 23642/38.)*
PIETERSBURG.—August 8th. Municipality. Electric motor-driven pumps. (T. 23601/38.)*

Southampton.—July 5th. Electricity Department. 11-kV, 6.6-kV and telephone cables. (June 24th.)

Southend-on-Sea.—July 9th. Corporation. Complete electrical installation at the Municipal Hospital, Rochford. (June 24th.)

Sunderland.—Town Council. Electrical installation at the nurses' home, Municipal Hospital, Hylton Road.

Uruguay.—MONTEVIDEO.—July 13th. Electricity Supply and Telephones Administration. 5,000 6-kV, 1,000 15-kV, and 300 33-kV porcelain insulators. (T. 23473/38.)*
July 21st. 32-V, 110-V, 225-V and 230-V metal filament lamps. (T.Y. 23556/38.)*

Watford.—July 13th. Corporation. Pumping plant consisting of duplicate sets of centrifugal bore-hole and high lift pumps complete with electric motors, control gear, valves, pipework, &c. Town Clerk, Municipal Offices, 14, High Street.

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Birmingham.—Town Council. Accepted. Electric vehicle batteries for twelve months.—D.P. Battery Co.; Young Accumulator Co. (1929); Britannia Batteries; Chloride Electrical Storage Co.
Electricity Committee. Accepted. Lighting repairs for twelve months. District No. 1.—W. J. Sheath. District No. 2.—H. Pratt. District No. 3.—Parker, Winder & Achurch. Electric lighting installation at Rubery school (£1,430).—Gordon Hughes Electrical Co. Electric service lift at Little Green Lane special school (£124).—Express Lift Co.
Accepted from March 18th to June 10th. Electric hoist at Hams Hall power station.—Herbert Morris. Electric cooker control units for twelve months.—Bill Switchgear. One boiler unit complete at Hams Hall power station.—International Combustion. 15-A d-p. main switch-fuses for twelve months.—Revo Electric Co. Moving coil regulators and static balancers.—Ferranti, Ltd. 30-A d-p. main switch-fuses for one year.—M.E.M. Co. Circuit-breakers.—Ferguson, Pailin. 500-kVA transformers and three automatic voltage regulators.—Ferranti.

Blackpool.—Town Council. Accepted. Installation of electric passenger lift at Talbot Road car park.—Evans Lifts.

Croydon.—Sewerage Committee. Recommended. Electrical gear (£75).—Brook Motors. Electrical wiring (£39).—A. E. Cook.

Doncaster.—Education Committee. Accepted. Electrical work in connection with the erection of Waverley School (£449).—N. S. Milan.

Exeter.—Electricity Committee. Accepted. Bulk supply feeder cable and control cable (£11,451) and feeder cable (£4,016).—Callender's. One 6,000-kVA transformer (£2,632).—G.E.C.

Grimsby.—Electricity Committee. Recommended. Four kiosks (£1,306).—Met.-Vick. Electrical Co. Four 100-kVA transformers (£492).—Brush Electrical Engineering Co.

Lanarkshire.—County Council. Accepted. Electrical work at seventy-six houses being erected at Mount Helen estate, Gartosh.—A. & C. Edleman.

London.—BERMONDSEY.—Electricity Committee. Accepted. Five feeder pillars and one panel (£234).—Henley's.
L.C.C.—Wiring and fittings for electric lighting, &c., in two blocks of dwellings at Browning estate (King and Queen Street area) and part block of dwellings on the Orb Street area, Southwark:

	£		£
Holliday & Son (Electrical). Accepted	**1,769**	Johnson and Tanner	2,200
G. E. Taylor & Co.	1,940	Electrical Installations	2,212
Houchin	1,962	Service Electric Co.	2,225
J. L. Shadwell	2,095	Evans and Shea	2,241
Jacob, White & Co.	2,176	City Electrical Co.	2,294

Wiring and fittings for electric lighting, &c., in two blocks of dwellings on the Savona Street area, Battersea:

	£		£
Archibald Meckhonik. Accepted	**2,357**	F. C. Edey & Co.	2,643
E. Dyne & Co.	2,467	Read and Partners	2,725
Ryland's Electrical Co.	2,545	Pinching and Walton	2,777
Springvale Electrical Co.	2,636	W. H. Gaze & Sons	2,795

Wiring and fittings for electric lighting, &c., in new V.D. Unit, Caterham Hospital:

	£		£
Bower Engineering Works (Electrical and General). Accepted	**450**	G. E. Taylor & Co.	511
Caine Pernot	467	Read and Partners	525
Francis Polden & Co.	470	W. J. Furse & Co. (London)	550
A. Hawkins & Sons	485	Pemberton and Sturgess (Great Britain)	553
Gillham and Jones	508	Fred. L. McGhee & Co.	554

Wiring and fittings for electric lighting and power at Dunton Farm, Dunton, Essex:

	£		£
W. Steward & Co. Accepted ...	**502**	B. C. Bullard & Co.	799
Edgar C. Porter	612	Evans and Shea	818
Read and Partners	705	Mann, Egerton & Co.	898
G. E. Taylor & Co.	745	County of London Electric Supply Co.	1,170
T. Clarke & Co.	753		
Ilford Electrical Co.	768		

ST. PANCRAS.—Contracts and Stores Committee. Recommended. Electrical wiring of the electricity distribution offices, Pratt Street, Camden Town (£308).—W. Seymour & Co. One electric vehicle battery for the Highways Department (£119).—Edison Swan Electric Co.

STEPNEY.—Finance and Parliamentary Committee. Recommended for twelve months. D.c. prepayment meters.—Ferranti (£1,818); Chamberlain & Hookham (£1,818). A.c. ordinary, prepayment, two-part tariff and polyphase meters with demand indicator attachment (£9,717).—Aron Electricity Meter. D.c. and a.c. demand indicators (£296).—Reason Manufacturing Co. Conduits (£769) and troughs and covers (£449).—Albion Clay Co. Lamp shades (£360), ceiling roses (£122), lampholders (£108) and switch fuses (£243).—Wholesale Fittings Co. Joint boxes (£307).—Wm. White & Co.

Motors, control equipment and other apparatus in connection with change-over from d.c. to a.c. supply: Scottish Sanitary Laundry (£659).—J. G. Sneath. Grafton Street area (£167).—Lancashire Dynamo & Crypto.

LONDON AND HOME COUNTIES JOINT ELECTRICITY AUTHORITY.—Accepted. One additional 250-kW rectifier line set and one set of high-frequency choke coils for Udney Farm sub-station (£945).—Hewittic Electric Co.

METROPOLITAN WATER BOARD.—Recommended. Six electric generators for coupling to steam turbines (£6,245).—Bruce Peebles & Co. Eight electrically driven centrifugal pumps (£14,243).—Harland Engineering Co. Ten oil engine driven electric generators (£36,740).—J. Fowler & Co. (Leeds).

Accepted. Electrical installation at Bostall Heath station (£70).—R. Langston-Jones & Co. Electrical equipment at Hampton pumping station (£71).—Power Centre Co. Cable for Hampton works (£81).—G.E.C.

Normanton.—U.D.C. Accepted. Erection of overhead electric lines from Normanton Brickyard, Wakefield Road to Newland Brickyard (£326).—Transmission Lines & Cable Construction Co.

Slough.—U.D.C. Accepted. Installation of a two-way switch in each of the Council's houses at Upton Lea (£210).—Slough Electrical Co.

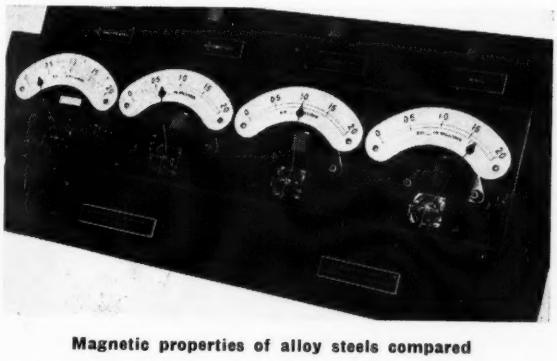
Notes

Cable Box Compounds

A new specification for solid bituminous filling compounds for cable boxes on systems up to and including 11 kV deals with two general types of compound, one being a natural bitumen and the other having a petroleum residue base. Limiting values for various characteristics of the material are specified, and the methods of test are described in detail. They are in general similar to those laid down in B.S.S. 688, a few modifications having been introduced to meet the special requirements of cable box compounds. Copies of the specification (B.S.S. 803-1938) may be had from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

Visual Comparison of Magnetic Energy

Since the introduction, in 1930, of a new series of permanent-magnet steels, the principal alloying elements of which are nickel and aluminium, a good deal of development has taken place, and these alloys are claimed to offer the maximum magnetic energy per unit volume or weight available. One of the best known is Alnico, which contains 20 per cent. nickel, 10 per cent. aluminium and 10 per cent. cobalt. It possesses a high coercive force and usually a lower remanence than the older steels. The new magnets are, therefore, generally of greater cross-section for a given result, but can be used in much shorter lengths. A comparison of the magnetic energy per unit volume available with various permanent-magnet materials is made by indicating instruments exhibited by the Mond Nickel Co., Ltd., at the Empire Exhibition, Glasgow. This exhibit has been prepared with the co-operation of William Jessop & Sons, Ltd., and Elliott Bros. (London), Ltd.



Magnetic properties of alloy steels compared

These four instruments, which are in effect voltmeters, are connected in series, so that with the same current passing through each the only difference is in the material used for the field magnets, which have been designed to give the maximum energy for each material while maintaining an equal volume, the geometrical proportions of which are shown. The deflections of the pointers, therefore, measure the relative values of the BH_{max} for the different magnet steels—tungsten steel, 15 per cent. cobalt steel, 35 per cent. cobalt steel and Alnico. The damping as well as the deflection is greatest with Alnico. The first three have relatively high remanence value, while the Alnico has a high coercive force.

Report on Scottish Mines

The Secretary for Mines announces the publication of Mr. T. Ashley's report for 1937 on the inspection of mines under the Coal Mines Act, 1911, in the Scotland Division. One matter dealt with (to which increasing attention is generally being devoted following the explosion at Holditch Colliery, North Staffs) is the risk of the ignition of firedamp by sparking or heating from coal-cutter picks. Such occurrences are relatively more frequent in Scottish collieries than elsewhere, and during the year fourteen cases were reported. Mr. Ashley is also concerned at the increasing extent to which electric motors are used for auxiliary ventilation, and he feels that this tendency is a grave and costly reflection on the efficiency of the ventilation of the mines concerned. Copies of the report (post free 1s. 2d.) can be obtained from any bookseller or directly from H.M. Stationery Office, at Adastral House, Kingsway, London, W.C.2, or 120, George Street, Edinburgh, 2.

The Progress of Rubber

Publication in a convenient form of a series of systematic annual reports on the progress of rubber technology has commenced with the issue of Vol. I (pp. 153 including name and subject indexes) by the Institution of the Rubber Industry, 12, Whitehall, S.W.1, at a price of 10s. 6d. to non-members. The object is to epitomise the principal advances made, the surveys of the different sections having been prepared by experts distinguished in their respective branches. The subject of cables and electrical insulation is dealt with by Mr. C. J. Beaver in seven pages.

A Withdrawn Propaganda Circular

Recently a question was asked in the Northern Ireland House of Commons relating to the issue by the Electricity Board of Northern Ireland of a circular summarising the contents of a book "The Curse of Cancer," by D. Brownlie. In this it was suggested that cooking with gas that had been produced by carbonisation at more than 1,450 deg. F. might be a contributory cause of cancer. The Minister of Commerce replied that he strongly deprecated this form of propaganda and stated that no more would be permitted. The question included a reference to a statement emanating from the Imperial Cancer Research Fund which was said to have described the book as a tissue of errors. The director of the Fund, Dr. W. E. Gye, has subsequently explained, however, that while his personal view is that the theory promulgated is wholly erroneous, he had not authorised its publication and that the Fund as a corporate body would in no circumstances express any opinion on the book.

Institute of Wireless Technology

At a special meeting of this Institute on July 15th the president, Mr. Sydney A. Hurren, M.C., is to deliver a lecture on "A New System of Pianoforte Electro-Acoustics." The lecture will be followed by a demonstration.

Protecting Rural Lines

The Metz Electric Co. has been experimenting for the past two years with metal poles of a girder type, from the cross-arms of which conductors are supported by chains of two suspension-type insulators, generally of glass. Glass suspension insulators can be tested by polarised light for internal strains before they are installed, so ensuring the use of only good material. Moreover, when the conductor is suspended it is difficult for a bird to rest on it in such a position as to cause accidental contact with an arm, and large birds generally rest on the arms and not on the conductors. Moreover, rupture of one span from mechanical overload no longer causes a whole line of poles to collapse. The play which the chain insulators introduce permits strains to be taken up over several spans so that not only is the danger of collapse of a line lessened, but a much greater mechanical strain is required to cause the initial rupture of a span.

Address Wanted

Will "Heating Engineer," who has sent us an article, kindly let us have his name and address?

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

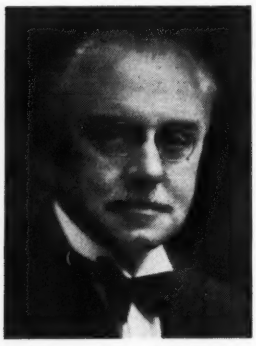
Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

TERO cord absorber.
CHROMORA photo light.
PHŒNIX cooker.
INVINCIBLE stop valves.
Grip switch for portable appliances.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. de Turckheim, secretary of the Incorporated Association of Electric Power Companies since 1905, has retired from that position and he has been succeeded by **Mr. A. Home - Morton,** M.Inst.C.E., M.I.Mech.E., M.I.E.E. Mr. Home-Morton was educated at St. Paul's School, London, King Edward VI High School, Birmingham, the Royal Technical College, Glasgow, and the University of Glasgow. He was apprenticed in the engineering works of Tangyes, Ltd., and became assistant and chief assistant to his father, Mr. D. Home-Morton, consulting engineer, Glasgow, and thereafter was partner in the firm of D. & A. Home-Morton, consulting engineers and industrial works designers. At the conclusion of the war Mr. D. Home-Morton retired and Mr. A. Home-Morton travelled extensively for commercial enterprises in the United States, Belgium, France, Germany, Switzerland, Italy and Poland. In January last year he was engaged on private secretarial work for Capt. J. M. Donaldson, president of the Incorporated Association of Electrical Power Companies, and in April, 1937, he was appointed secretary to the joint committee specially set up by the Association, the Provincial Electric Supply Association and the London Electricity Supply Association to deal with the common interests of the whole of the companies in so far as they might be affected by legislation arising out of the McGowan Report. In September he became assistant secretary and secretary-designate of the Association.



[*R. Haines*

Mr. A. Home-Morton

Mr. R. Pattison, senior lecturer in engineering at Leicester Technical College, has been appointed head of the engineering department of Bromley Municipal College.

Mr. E. G. MacKenzie, who has been electrical engineer and manager to the East Dereham Urban District Council since 1932, has tendered his resignation. He previously held an appointment under the Stoke Newington Borough Council. No appointment has yet been made in his place.

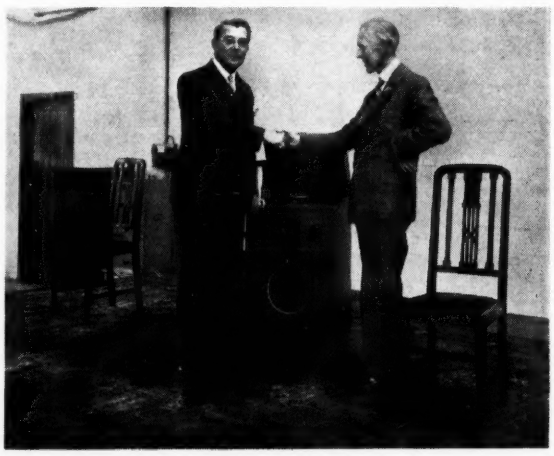
As mentioned in our last week's issue (page 930), over a thousand employés of the Guiseley factory of Crompton, Parkinson, Ltd., and their friends recently celebrated the foundation thirty years ago of the firm of F. & A. Parkinson.

A group at the Parkinson celebrations

The accompanying photograph shows Mr. H. H. Ganney, Mr. E. W. Abbott, Mr. Frank Parkinson, Miss N. Senior, Mr. Albert Parkinson and Mr. E. Scott, who attended the celebrations.

Mr. R. A. Marples, director of Asea Electric, Ltd., and the Fuller Electrical & Manufacturing Co., Ltd., has retired this week after just over fifty years' active business life in the engineering trade. After being educated at Clewer House School, Windsor, and for two years in Germany, he commenced his technical education in 1887 by becoming a premium apprentice with George Wales & Co., with whom he served five years. During this period he was a regular evening student at the City and Guilds Institute under Professors Silvanus P. Thompson, Perry and Halliday. For about nine years he was assistant engineer to Bergtheil & Young, electrical contractors, and left them to start a business of his own as partner in the firm of Marples & Leach. Owing to the War this business was unable to continue and early in 1915 Mr. Marples joined the Asea organisation, which was at that time run under the name of the Swedish General Electric, Ltd., and he was to a large extent responsible for the development of their business in the sale of motors and generators and special types of printing press equipment. The Century Company's agency was transferred to the company. In 1921 the sales organisation of the Fuller Electrical & Manufacturing Co., Ltd., was amalgamated with that of Asea, and Mr. Marples was made responsible for its development. At a complimentary luncheon at the Savoy Hotel given by Mr. S. Busch, managing director of Asea Electric, Ltd., on June 20th, Mr. C. E. White, European sales manager of the Century Electric Co., presented him with a gold watch.

Mr. C. Corbett, who has completed fifty years' service with the Edison Swan Electric Co., Ltd., recently received a presentation from Sir Felix Pole, chairman of Associated Electrical Industries, Ltd. Sir Felix said that this was the sixth presentation he had made to members of the company who had served it for fifty years. Mr. Corbett entered the company's service in 1888. Five years later he took charge of the testing department, to which later was added photometry. Out of Mr. Corbett's fifty years' service forty years had been spent in actual charge of a department.



Sir Felix Pole (left) making a presentation to Mr. C. Corbett, who has completed fifty years' service with the Edison Swan Electric Co., Ltd.

Mr. A. More, Kirk House, Wick, has been appointed electricity manager by Wick Town Council out of fifty-eight applicants. Mr. More graduated B.Sc. at Edinburgh University.

Mr. W. J. Allbright, local manager to the South London Electric Supply Corporation, Ltd., has retired this week from that position. Mr. Allbright, who has been connected with the electrical industry for forty-eight years, was a pupil with E. W. Bowles & Co., Westminster, and the House to House Electric Supply Co., Ltd. Later he rejoined the staff of the House to House Co. (afterwards known as the Brompton & Kensington Supply Co., Ltd.) as engineer first in the generating station and afterwards in the mains department, being appointed chief mains engineer in 1894. In 1904 he was appointed resident engineer of the Blackheath & Greenwich District Electric Lighting Co., in charge of the then recently acquired undertaking of the Crystal Palace & District Electric Light Co., to change the system from the Oxford d.c. system to the a.c. system of the Blackheath Co. He was appointed mains engineer of the whole area of the Blackheath & Greenwich Co. in 1906 and continued in this post when the name of the company was changed to the South Metropolitan Electric Light & Power Co., Ltd. In 1912 he became distribution engineer to the West Kent Co., and in 1927 he was appointed local manager of the South Metropolitan Co., the West Kent Electric Supply Co., Ltd., the Chislehurst Electric Supply Co., Ltd., and the South London Electric Supply Corporation, Ltd. He held that position with the first three-mentioned companies until 1936, and continued with the last-mentioned company until his retirement.

Mr. W. J. Allbright

Consequent on the impending retirement of the Barnes borough electrical engineer, **Mr. C. S. Davidson,** and the appointment of his deputy, **Mr. K. D. Bullpitt,** to his position, the Lighting Committee is to advertise for a new assistant electrical engineer at a salary of £619 per annum.

Mr. W. A. Gallon, who has been appointed assistant borough electrical engineer at Southampton, has for the past three and a half years been chief assistant electrical engineer with the Plymouth Corporation. Before going to Plymouth he was senior assistant electrical engineer and power station manager at Billingham for Imperial Chemical Industries, Ltd., and previously served for seven years at Thornaby-on-Tees with the North Eastern Electric Supply Co. He was educated at Armstrong College, Durham University, where he took his B.Sc. degree. Mr. Gallon is a member of the Institution of Electrical Engineers.

Obituary

Mr. J. Severs.—The death occurred on June 23rd, at the age of sixty-nine, of Mr. John Severs, F.C.G.I., M.Inst.C.E., M.I.E.E., who retired from the position of electrical engineer at the Royal Arsenal, Woolwich, in 1933. Early in his career Mr. Severs was demonstrator in electrical engineering under the late Prof. Ayrton at the City and Guilds Central Technical College. Later he became assistant electrical engineer in the construction and equipment of the Central London Railway, and performed similar duties on the G.N. and City Railway, where he subsequently was responsible for the running and maintenance of the permanent way, rolling stock, and repair shops. He went to Woolwich in 1913 and up to his retirement was responsible for the generation and distribution of electricity within the Arsenal.

Mr. Richard Edgar Lamb, chairman of the Northampton Electric Light & Power Co., Ltd., and its associated companies at Wellingborough and Rushden, died at a London nursing home on June 23rd. He became a director of the companies in 1925, and was elected chairman on the death of Ald. F. H. Thornton at the end of last year.

Mr. T. W. Sampson.—The funeral took place at Ardsley last week of Mr. Thomas William Sampson, of Sheffield, who was well-known in connection with electrical installations in hospitals in the north of England. Mr. Sampson, who carried on business as electrical engineer and contractor at the Electron Works, Sheffield, made a special study of X-ray equipment, and was responsible for installations at Sheffield, Leeds, Wakefield and many other places. During the war he made a number of extremely delicate instruments for the Admiralty.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Radio Service (Bromley) Ltd.—Private company. Registered June 25th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of and dealers in radio sets and accessories, &c. The directors are: A. F. Richer, 14, Cloisters Avenue, Bickley, Kent; and A. G. Scagell, 25, Glenview Road, Lewisham, S.E.13. Registered office: 151/3, High Street, Bromley, Kent.

W. J. Davis & Co., Ltd.—Private company. Registered in Dublin on June 17th. Capital, £3,000. Objects: To act as salesmen and vendors of, agents for and dealers in electrical vehicles, instruments, articles and products, &c. The directors are: W. J. Davis and Mrs. M. M. Davis, both of "Avonmore," Drimnagh Road, Crumlin, Dublin.

J. F. Poynter, Ltd.—Private company. Registered June 24th. Capital, £1,000. Objects: To carry on business as manufacturers of and dealers in electric and other lamps, &c., and to adopt an agreement with Poynter Griffiths & Co., Ltd., for the acquisition of the registered trade mark "Maxim." The first directors are J. F. Poynter, H. Poynter and H. G. Poynter. Solicitors: Cardew Smith & Ross, 27, Ely Place, E.C.1.

Welburn (Radio), Ltd.—Private company. Registered June 24th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in radio apparatus, &c. The directors are: L. W. Brown, B.Sc., Ph.D., 2, Endsleigh Place, W.C.1; R. Brown, 74, Benton Road, Newcastle-on-Tyne; and W. Thompson, 2, Endsleigh Place, W.C.1. Secretary: R. Brown. Registered office: Queen's Way, Team Valley Trading Estate, Gateshead.

F. Wellum, Ltd.—Private company. Registered June 24th. Capital, £2,000. Objects: To carry on the business of importers and exporters of, agents for and wholesale and retail dealers in radio, television and other sound producing or musical instruments, &c. The directors are: Mrs. F. M. Wellum, E. H. Gowing and F. E. Wellum, all of 2, Holden Way, Upminster. Registered office: 110, High Street, Hornchurch, Essex.

Resistances, Ltd.—Private company. Registered June 24th. Capital, £2,000. Objects: To carry on the business of general and electrical engineers, manufacturers of electrical resistances, switches and other electrical apparatus, &c. The directors are: A. W. Hardwick, 18, Hollycroft Avenue, Wembley; and H. E. Waller, 63, Cotswold Gardens, East Ham. Registered office: 196/8, High Street, Stoke Newington, N.16.

Somerset Wire Co., Ltd.—Private company. Registered June 20th. Capital, £15,000. Objects: To carry on the business of wire drawers, wire workers and weavers, machinists, &c. The directors are: W. H. Berryman and R. G. Berryman, both of "Rhiwbina," Bristol Road, Bridgwater; and J. Hughes, 98, Wembdon Road, Bridgwater. Registered office: Bristol Road, Bridgwater.

Industrial Insulations, Ltd.—Private company. Registered June 17th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in insulating tapes and fabrics, and insulating products of all kinds, adhesive tapes, &c. The directors are: J. Entwistle, "St. Albans," Broadway, Letchworth; R. W. McCrone, Pitliver House, Charlestown, Fife (chairman); and D. A. Irvine, 37, Fitzjohn Avenue, Barnet. Registered office: Bush Lane House, Cannon Street, E.C.4.

City Supply Company (British Opelite), Ltd.—Private company. Registered June 20th. Capital, £500. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in electrical goods, plant, machinery, lamps, bulbs, lamp shades and television and radio sets, &c. The directors are: S. Zetland (permanent director and chairman), 11a, Heath Drive, N.W.; and A. H. Francis, 1, Rosslyn Court, Ornan Road, Hampstead, N.W.3. Secretary: Ben Wortman, 30, Greenfields Gardens, N.W.2.

D. Assersohn, Ltd.—Private company. Registered June 20th. Capital, £5,000. Objects: To carry into effect an agreement with Charlotte Assersohn and J. I. Assersohn for the purchase of the businesses of D. Assersohn and George Fairest & Son, formerly carried on by the late D. C. Assersohn, and to carry on the business of electrical engineers, lighting and power contractors, brass and iron founders, lamp makers, makers of reflectors, advertising signs, &c. The permanent directors are: Charlotte Assersohn (chairman) and J. I. Assersohn (vice-chairman), both of 30, Corfton Road, Ealing, Middlesex. Secretary: Victor A. Wexham. Registered office: 31/3, St. Bride Street, E.C.4.

Ritelite, Ltd.—Private company. Registered June 20th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in electrical goods, lamps, radiators, fires, cookers, irons, vacuum cleaners, &c. The directors are: L. Abrahams, 7, Woodstock Street, Oxford Street, W.1; and Mrs. A. Abrahams, 28, Highcroft Gardens, Golders Green, N.W.11. Registered office: 67, New Bond Street, W.1.

F. Fradley, Ltd.—Registered June 22nd. Capital, £1,500. Objects: To acquire the business of an electrical engineer and contractor and builder carried on by F. Fradley at 21-23, Hope Street, Hanley, Stoke-on-Trent, as the Northmere Building Co. The directors are: F. Fradley (permanent governing director) and Mary Fradley, both of Burleigh House, Foxearth, near Werrington, Staffs; and Alice M. Smith, 85, Eaton Street, Hanley, Stoke-on-Trent. Secretary: S. H. O'Connell. Registered office: 21-23, Hope Street, Hanley, Stoke-on-Trent.

Sharpe's Electrical and Domestic Utilities, Ltd.—Private company. Registered June 22nd. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in electrical appliances and accessories, &c. The directors are: J. Sharpe (permanent and managing director and chairman), address not stated; H. Sharpe, 6, Windsor Road, Westcliff-on-Sea; and A. W. Godfrey, 3, Robins Court, Kings Avenue, Streatham. Registered office: 179, High Street, Southend-on-Sea.

A. E. Brain & Son, Ltd.—Private company. Registered June 21st. Capital, £1,000. Objects: To carry on the business of dealers in radio and television receivers and transmitters, &c. The directors are: A. Edwin Brain and A. Edward Brain, both of 35, Chester Street, Coventry. Registered office: 1, Primrose Hill Street, Coventry.

C. Knowles, Ltd.—Private company. Registered June 23rd. Capital, £2,000. Objects: To carry on the business of manufacturers and repairers of and dealers in electrical and mechanical apparatus and fittings, radio sets, refrigerators, vacuum cleaners, &c. The directors are: H. W. Ford, Elmcroft, The Park, Thurgarton, Notts, and three others. Registered office: 31, Derby Road, Nottingham.

Returns of Electrical Companies

L. Jones (Burslem), Ltd.—Capital, £1,500 in £1 shares. Return dated April 6th. 1,000 shares taken up. £550 paid. £450 considered as paid. Mortgages and charges, nil.

Power Units, Ltd.—Capital, £1,000 in £1 shares. Return dated December 25th, 1937 (filed April 23rd, 1938). All shares taken up. £1,000 paid. Mortgages and charges, nil.

Switchgear Testing Co., Ltd.—Capital, £30,000 in £1 shares. Return dated March 23rd. All shares taken up. £30,000 paid. Mortgages and charges, nil.

M. & W. (Radio & Electrical), Ltd.—H. L. Nixon, Greenshades, 18, Outwood Avenue, Horsforth, Leeds, was appointed receiver and manager on June 13th under powers contained in debentures dated October 27th, 1936.

McEwan & Co. (Brighton), Ltd.—N. W. Osborne, 11/12, Finsbury Square, E.C.2, was appointed receiver on June 8th under powers contained in debentures dated January 27th, 1932.

Ferguson Radio Corporation, Ltd.—The nominal capital has been increased by the addition of £5,000 beyond the registered capital of £40,000. The additional capital is divided into 2,000 ordinary shares of £1 and 60,000 founders' shares of 1s.

British Boiler Accessories, Ltd.—The nominal capital has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £100.

Home Wireless Service (Brighouse), Ltd.—The nominal capital has been increased by the addition of £2,000 in £1 ordinary shares beyond the registered capital of £2,000.

Universal Metal and Neon Works, Ltd.—Satisfaction to the extent of £500 on May 31st, 1935, of debenture dated March 22nd, 1937, and registered April 12th, 1937. Particulars filed of £3,000 debentures authorised May 18th, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £1,000. Issue on June 7th of £2,000 debentures, part of a series already registered.

Willdays (Derby), Ltd.—Further charges on the company's undertaking and property, present and future, including uncalled capital, dated May 30th, to secure £500. Holder: Mrs. A. Willday, 4, Dig Street, Ashbourne, Derbyshire.

Ship Carbon Co. of Great Britain, Ltd.—Satisfaction in full on June 13th of debentures authorised January 29th, 1936, and registered February 14th, 1936. (According to the register of mortgages the debentures registered February 14th, 1936, originally secured £125,000.)

J. & N. Wade (London), Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated June 9th, 1938, to secure £1,500, and ranking *pari passu* with an existing debenture. Holders: Branch Nominees, Ltd.

E.G.S. Co., Ltd.—Mortgage on 10 and 12, Trafalgar Street and land adjoining Newcastle-upon-Tyne dated June 11th, 1938, to secure £8,000 and any further advances. Holders: Newcastle-upon-Tyne Permanent Building Society.

Newcastle and District Electric Lighting Co., Ltd.—Capital, £600,000 in £1 shares. Return dated April 1st, 1938. All shares taken up. £600,000 paid. Mortgages and charges, £150,000.

Electrical Distribution of Yorkshire, Ltd.—Capital, £3,200.000 in £1,200,000 6 per cent. cumulative preference stock, £1,500,000 ordinary stock and 500,000 unissued shares of £1. Return dated March 28th, 1938. All preference and ordinary stock taken up. £2,700,000 paid. Mortgages and charges at date of return, nil. £500,000 debenture stock has since been issued.

Particulars filed of debenture stock to secure £500.000 and further sums and premium of 1 per cent. authorised May 9th, 1938, and covered by trust deed dated June 1st, 1938, charged on the company's undertaking and other property, including uncalled capital, the whole amount being now issued. Trustees: Barclays Bank, Ltd. (The total amount outstanding at any one time is not to exceed half the paid up shares.)

Electric Supply Corporation, Ltd.—Capital, £750.000 in 250.000 preference, 431.262 ordinary and 68.738 unissued shares, all of £1. Return dated May 9th, 1938. All preference and ordinary shares taken up. £529.000 paid on 250.000 preference and 279.000 ordinary shares. £152.262 considered as paid on 152,262 ordinary shares. Mortgages and charges, nil.

Marshall Electrical Co., Ltd.—Capital, £3,000 in 2,300 preference and 700 ordinary shares of £1. Return dated November 26th, 1937. 2,300 preference and 683 ordinary shares taken up. £2,303 paid on 2.300 preference and 3 ordinary shares. £680 considered as paid on 680 ordinary shares. Mortgages and charges, nil.

United Telephone Cables, Ltd.—Capital, £1.000 in £1 shares. Return dated May 26th, 1938. All shares taken up. £1,000 paid. Mortgages and charges, nil.

City Notes

The General Electric Co., Ltd., held its annual meeting on Monday last when Lord Hirst (chairman and managing director), who presided, said that the company was entering on its fiftieth year, and the figures now presented were a worthy result of fifty years' continuous endeavour. Practically all their departments, all the territories in which they operated had contributed to this satisfactory result, and they had made considerable advance in their export business, in spite of great demands on their resources in the home market; their export total had beaten the 1929-30 record by nearly half a million pounds. The exports to the extent of 78 per cent. had gone to the Empire. Their principal customer was again South Africa. They were particularly pleased with the progress made in the Crown Colonies during the past year. Owing to economic conditions they were doing little business in Canada and the European countries. The only overseas branch which showed negative results was China, due to the disturbed conditions there. Their new company in New Zealand had amply justified the venture. As regarded home business, whilst coping with a record demand for their products, they had not neglected new developments. At their Witton works they had now erected an entirely self-contained shop for the manufacture of mercury arc rectifiers. They had had satisfactory contracts for these rectifiers from the London Passenger Transport Board, and had also received a number of orders from Athens, Canton, Melbourne, Perth, Johannesburg and Hong Kong. They had also made further progress in the design of turbo sets of unusually high generating voltage at 3.000 r.p.m. Some of these sets with a capacity up to 40.000 kVA and 22.000 V were in hand for Stockport, Stepney, Darlington, Woolwich and overseas. They had obtained a number of big contracts in the paper industry and in the steel industry, and in the latter their electric furnaces had been particularly successful, one contract being from the Karabuk steel works in Turkey. The use of the trolley bus continued to increase, and they had received orders from many parts of the country and abroad. Further progress was to be recorded in the equipment of ships. Their Fraser and Chalmers Engineering Works were busy with contracts for turbines, both at home and abroad and for the Government, and they continued to get new contracts for the Chance coal washer.

In the field of communications their telephone works had been engaged to their full capacity throughout the year. They had been entrusted with the whole of the new central automatic exchange equipment for Glasgow, which would replace the first public exchange built by them in 1910. The contract would be between £400,000 and £500,000. The radio industry had fallen on evil times, but notwithstanding this they had taken a larger quota than they had ever done before in the "mains" market. Their Salford Instrument Works were at present occupied with the production of a number of delicate instruments for the Government and for new industries. Their Magnet Works, where they produced domestic fittings and appliances, had been fully engaged both for domestic and industrial cooking equipments, and also in the development of a number of new fittings. The Pirelli-General Cable Works had been fully employed, and among outstanding contracts were those received from the Southern Railway for fifty-three miles of super-tension and pilot cables, and a further order for nine miles of 66 kV oil-filled cable for the Central Electricity Board. Great progress had been made in the further development of telephone cables, particularly by increasing the number of channels per circuit.

Continued improvements had been made in the "Osram" lamp and the "Osira" discharge lamp, the production of quartz lamps, and in the manufacture of cathode-ray tubes for television. Further improvements were to be recorded in "Osram" valves and in the use of "Osira" fluorescent tubes for lighting. Most of the lighting work at the Empire Exhibition, Glasgow, had been carried out by them. Subsidiary companies, such as the Express Lift Co. and Chamberlain & Hookham, Ltd., were doing well, while their various utility companies, controlled by the Electrical Development and Securities Trust, had made good progress, the kWh sold between 1935 and 1937 rising from 35 million to 54 million kWh. the increase last year being 21.5 per cent.

They proposed to mark this jubilee year by endowing a fund of £10,000 at the University of Birmingham, as in the Midlands they employed the majority of their 40.000 workers. The £10,000 was to be used for two G.E.C. scholarships, under conditions which were now being elaborated between them and the University. With regard to the future, Lord Hirst said he was of opinion that any recession in activity was due more to psychological effects than to economic setbacks. We might not reach the achievement of 1937, but he was informed by the electrical industry and by many other industries that a comparison with the last normal year—1936—showed that we were in advance of that year. The armament programme brought up in the minds of people the fear of shortage of raw materials and stock, and they filled their shelves beyond their requirements; part of the recession was due to a temporary lull required to absorb the surplus stock. He had gained the impression during the last three or four weeks that many of the shelves now required replenishing.

Keith Blackman, Ltd.—Presiding at the annual meeting on June 24th Mr. G. Keith (chairman and managing director) said that the increased trade activity referred to at the last annual meeting continued throughout the year under review with gratifying results. They had established another high record in output from their respective works, and the turnover for 1937-38 considerably exceeded that of the previous year. The outlook for the current year was a little obscure. In common with market tendencies generally they had recently experienced a slight setback in orders. With a wider range of specialities to sell, an extension of the armament programme, and the coming into operation of the 1937 Factory Act this year—which was likely to bring considerable business to them—they were hopeful that they would be able to secure a satisfactory proportion of the orders available. They had carried over from the last financial year a larger volume of unexecuted orders than for many years past. The new works at Tottenham were nearing completion, and in the course of two or three months the second section of the works would be finished and the machinery installed. The general offices and canteen buildings were well in hand and it was anticipated that they would be ready for occupation by the end of December next.

Edmundson's Electricity Corporation, Ltd.—Reviewing the company's development during the past five years Sir Thomas Royden, the chairman, stated at the annual general meeting held on June 23rd that the accomplishment of the 1933 programme (which initiated a policy of co-ordinated control of all companies in the group) had presented many complex problems in that it required that the interests of the consumers served, the moneys of the investor, and the company's interests generally should all have fair and equitable treatment. The numerous consolidations had advanced according to plan, and six direct subsidiaries and twenty-six sub-subsidiary companies had been put into liquidation. When the liquidations now in progress or in immediate contemplation were completed within the next year or two the sub-subsidiaries would be eliminated and the group would consist of Edmundson's as the parent company and ten or twelve directly-owned operating subsidiaries only. The McGowan Report strongly recommended this policy of amalgamation. The company's objective in 1933 was to double the business in five years. This had actually been exceeded, the number of consumers increasing from 176,000 to 378,100, kWh sold from 321,027.000 to 735.933,000, and the load connected from 496,000 to 1,060.000 kW. Overhead and underground mains had increased by 5.200 miles, 1,235 villages with a population of 425.000 had been connected, and £9.633,000 of additional capital had been expended. The chairman saw no reason why during the next five years the company's business if left alone should not again be doubled. During the past year alone 45,000 new consumers had been added, an increase of 14 per cent., 165,800 kW of new load had been connected (19 per cent. increase), and output had grown by 104.350,000 kWh. Under the direction of the Central Electricity Board the capacity of the Shropshire Co.'s Stourport station was being increased by 90.000 kW to 170.000 kW. the South Wales Co.'s Upper Boat station by 60.000 to 123.000 kW. and the Cornwall Electric Power Co.'s Hayle station by 15.000 kW to 32,500 kW. Furthermore, an entirely new station was in the preparatory stages of construction at Little Barford (Bedfordshire) with an initial capacity of 60,000 kW. which would eventually be doubled. The station was to be constructed by a new company, "The B.C. and H. Power Station Co., Ltd." (the application list for the £1.650.000 3½ per cent. first mortgage debenture stock required to finance this company was oversubscribed on June 23rd five minutes after opening).

Altogether the companies in the group had now under construction 225,000 kW of additional plant, bringing the total capacity of their selected stations to 385,500 kW. Regarding the Oxford Corporation's recent opposition to the Wessex Bill, Sir Thomas said that had the city been successful in its efforts and if the precedent thereby established had been followed by the many other urban centres similarly situated the company, and probably many others, would have lost such a large proportion of its consumers and load as to have made the continuation of rural development and supply economically impossible. During the two years that had passed since the McGowan Report had been issued the public in general and the electrical industry in particular had been awaiting the introduction of legislation. This legislation was confronted with what might be described as a psychological blockade caused by an effort to solve an economic problem of vital importance by the application of political considerations. While it would be idle to speculate upon the form of the Bill which might be introduced next autumn, the uncertainties surrounding the whole situation were daily becoming more acute. If the Government saw difficulties which were such that they desired additional time for consideration, it would be a help if legislation were introduced as soon as practicable under which the present *status quo* of both municipal and company interests—without prejudice to either—could be maintained for, say, not less than five years. This would enable many of the interests concerned voluntarily to work out by mutually satisfactory agreements many of the problems which were at present in a state of complete uncertaintv.

The Electric Construction Co., Ltd., held its annual meeting on June 28th, when Mr. J. Gray (chairman and managing director), who presided, said that although during the closing months of the past financial year a recession was experienced, the volume of orders for the whole year was 17 per cent. greater than in the preceding year. The increased demand emanated chiefly from domestic sources, but orders for export also exhibited a gratifying improvement. The actual turnover exceeded that of any previous year, and there was more than a commensurate improvement in manufacturing profit. The recession in the volume of orders still prevailed and it was generally recognised that trade during the current year would be less prosperous than it had been for two or three years. Unless, however, the recession in the electrical industry was much greater than anticipated, the future need not be regarded with misgivings so far as they were concerned.

Newman & Watson, Ltd.—Presiding at the annual meeting on June 28th Mr. A. A. B. Walford (chairman) said that they had been faced with very difficult trading conditions since they last met and had actually sustained a trading loss during the first six months of the year. That loss had been primarily due to the abnormal rise in the price of lead which had cost the company over £8,000, apart from the loss on other materials. Recommendations made as a result of investigations into the causes had been adopted, and the trading for the second half-year showed a sufficient profit to extinguish the loss for the first six months and to leave a margin of profit on the whole year amounting to £5,255. That had enabled the directors to pay the preference dividend, but it would not permit of any distribution on the ordinary shares. The turnover was larger than for both the prospectus period and the year to March 31st, 1937. Had it not been for the rise in the cost of materials the percentage of gross profit would have been little less than in previous years. As a means of maintaining this turnover on this increased scale the directors had decided to open an office in London at 45, Nottingham Place, W.1, in order to extend the activities of the heating and electrical engineering departments hitherto carried on from the Stockton office.

Hick, Hargreaves & Co., Ltd.—One of the most successful years in the history of the company was reported by Mr. W. D'Arcy Madden, chairman and managing director, at the annual general meeting held at Bolton on Tuesday. The turnover, he said, was 36 per cent. greater than in the previous year and all departments of the works had been fully employed throughout the year. The value of contracts obtained was approximately equal to the total for the previous year, and the value of uncompleted work on the company's books was 25 per cent. greater than at the commencement of the year and was equivalent to twelve months' work ahead. Condensing plant and auxiliaries remained the most important part of the business and, while each department showed a satisfactory advance, the year was notable for the extension of business in the industrial turbine, the turbo-compressor and the rotary air compressor departments. Important orders received for condensing plants included a fourth 75 000-kW plant for the Barking "B" power station, a second 30,000-kW plant for the Northampton Electric Light & Power Co., Ltd., two 30.000-kW units for Woolwich Borough Council, a 30.000-kW unit for Bolton Corporation, and also equipment for the Kuala Lumpur station. Steam turbine contracts included plant for textile, paper-making and coal industries. The outlook for the current year was favourable and there was no prospect of any diminution of the company's activities for some time to come.

The Young Accumulator Co. (1929), Ltd., held its annual meeting on June 27th. Mr. B. E. Ronaasen, who presided in the absence owing to illness of the chairman, Lt.-Col. L. P. Winby, said that the turnover was the highest yet reached by the company, as also was the trading profit and the net profit. The profit would have been considerably larger but for the high prices ruling in metals in the first half of the year. They hoped to conclude several agreements and had concluded one with an important battery company abroad, which had now installed the necessary plant for the manufacture of their patented separator "Porbonite" and armoured plates. As sales during the opening months of the current year had again shown a useful increase on the corresponding period of last year and were the highest ever reached for the period, and as their order book opened with a bigger figure than they had ever had, there was no cause to anticipate any reduction in turnover, but rather to look to continued expansion of business. Referring to the company's batteries for traction service, Mr. Ronaasen said that of the 750 electric road vehicles registered for the first time during 1937 the majority were fitted with Young traction batteries and about a thousand of such batteries were in service in this country. A number of those had now finished their three years of guaranteed service, and customers had given the company repeat orders. The Associated Electric Vehicle Manufacturers, Ltd., in which they were largely interested, was very busy and had substantial orders in hand.

The Atlas Electric & General Trust reports an income for the year ended March 31st, after providing for taxation and N.D.C., of £244,097, as compared with £235,633 in the previous year. After deducting debenture interest, expenses of removal into new offices, &c., there is a credit balance of £192,664, which with £37,929 brought in, makes £230,593. The dividend on the cumulative preference shares is paid, less tax, and £72,546 is carried forward. Operations of the subsidiary, Sociedad Comercial de Montevideo, have continued to be seriously affected by the terms of the settlement of the strike of tramway employés in April, 1936. The new Government of the State and new municipal officers at Montevideo took office on June 19th and negotiations will be resumed with them.

The Nico Light Co. reports a trading profit for the year ended March 31st of £7,701, as compared with £7,215 in the preceding year, and a net profit of £4,057 (against £5,123), to which is added £3,075 brought forward. The dividend is maintained at 6¼ per cent. and £2,679 is carried forward.

Chadburn's (Ship) Telegraph Co. reports a net profit for the year ended March 31st, after providing for taxation, of £6,365, as compared with £6,850 in the preceding year, to which is added £3,114 brought forward. It is proposed to pay a dividend of 6 per cent. for the year (same) and a bonus of 4 per cent. (same), leaving £5,129 to be carried forward.

The Brazilian Traction, Light and Power Co., Ltd.—Presiding at the annual general meeting held in Toronto, Canada, on June 21st, Mr. Miller Lash, the president, pointed out that the internal business in Brazil showed progressive improvements, although increases were less than last year. The reduction in 1937 in Brazil's favourable trade balance was due to a large increase in imports which it was hoped would be curtailed considerably in 1938. Mr. John Davidson and Mr. E. H. Stewart were elected to fill vacancies on the board.

The United River Plate Telephone Co., Ltd., reports a gross revenue for 1937 of £3.339.202 (against £2,740,034 in 1936) and a profit of £585,704 (£30,616). A final dividend of 3 per cent., making four per cent. for the year (same), is being paid, and £1,047,049 (£461,493) is carried forward.

The Abitibi Power & Paper Co., Ltd.—An appeal against the decision of the Supreme Court of Ontario dismissing a motion by the trustee of bondholders of the company for approval of a reorganisation plan put forward by a bondholders' committee, headed by Mr. J. P. Ripley, has been vetoed. Objections to the plan came from the Bondholders' Defensive Campaign, which has submitted its own reorganisation scheme.

The London Electric Wire Co. & Smiths, Ltd., is to pay an interim dividend of 2 per cent. (same).

Silentbloc, Ltd., announces a final dividend of 25 per cent., making 50 per cent. plus bonus of 8¼ per cent. (same) on larger capital.

Christy Bros. & Co., Ltd., report a first and final dividend of 11 per cent., less tax, for the year ended March 31st (against 10 per cent.).

Stocks and Shares

TUESDAY EVENING.

THE complexion of Stock Exchange markets has been completely changed by what can be fairly described as a dramatic alteration of conditions in the United States. In less than a week prices of some of the leading American stocks and shares advanced as much as 25 per cent. of their previous value.

A variety of reasons account for the recovery which, by the way, does not command the entire confidence of those who are watching the markets most closely connected with the Wall Street boom. Opinion leans to the view that business in the United States, notwithstanding the "pump-priming" that is already in operation, will take some time yet to rally from the despondency into which it lay plunged only two or three weeks ago. That conditions have altered is, however, clear enough, and the rises in stocks and shares have been accompanied by general advances in the prices of base metals, rubber and commodities. The moralist will maintain that the psychology of the American mind has undergone a change. The financial observer will contend that the market has swung over to the bull side after being bearish for many weeks. Both of these philosophers will be right.

Home Electricity Supply

It will not have escaped notice that the market for the ordinary shares of the home electricity group has shown a steadiness in prices which for many weeks past varied hardly at all. The list yielded ground every now and then in company with investment securities as a whole, but the declines have no further significance than this purely sympathetic tendency. Moreover, such falls as have occurred are relatively lighter than those to which even gilt-edged stocks were subjected by political, as well as financial, considerations. Study of the yields offered by the ordinary shares quoted in our weekly tables will indicate the confidence felt in their holdings by proprietors of the shares, for the latter give an average of approximately 4½ per cent. on the money at to-day's prices.

The Steadiest Industrials

Now 4½ per cent. is regarded as holding out no great attraction to the investor whose predilection, moreover, favours

shares priced at somewhere near their par value. The ordinary shares in this market stand, without exception, at substantial premiums. From reflections such as these, it is an easy step to our conclusion that shares in the home electricity supply companies make the effective answer to the question, so frequently heard to-day by Stock Exchange brokers, as to which are the steadiest industrials to be found in the Miscellaneous Market.

Associated Electricals are 1s. 6d. up, at 37s. 6d. Electric Supply Corporations have risen 1/8 to 52s. 6d. Edmundson's and Clyde Valley ordinary are both 6d. up.

Electrical Equipments Advance

It is as difficult to keep America out of notes on Stock Exchange markets this week as it was for Mr. Dick to refrain from mentioning King Charles's head in *David Copperfield*. The improvement in the prices of electrical construction and equipment shares is due largely to the genial influence of the change-over of sentiment in the American market. Investors have been watching electrical equipment shares for some time past, with the intention of picking them up when prices were sufficiently tempting. In the anxiety to get in at the bottom prices many people left their purchases until too late. As soon as the changed sentiment appeared there was a scramble to buy such shares as are set out in the final section of our Stock Exchange prices.

Crompton Parkinsons have been one of the features, with a rise from 25s. to 27s. 6d. Ericsson Telephones put on 1/-. British Insulated at 88s. 9d. are 5s. up. Callenders gained 3s. 9d. Johnson & Phillips and Siemens ordinary were amongst those for which investment inquiry led to improvement in price. British Aluminium, at 51s. 3d., are 2s. 3d. higher. Lancashire Dynamo at 57s. 6d. show 1/- advance. Henley's remain at 20s. The only decline in this group is one of 6d. in Ever Ready shares, which have eased off to 18s. 6d.

This Week's Meetings

Lord Hirst, at the meeting of the General Electric Company on Monday in this week, took legitimate pride in referring to the progressive manner in which his company had gone ahead in fair days and foul. His speech was a brief résumé of the policy which has brought the company to its present commanding and prosperous condition. The price of the shares at 75s. 6d. has put on 3s. 6d. upon last week's gain of 3s.

Another interesting meeting was that of the Globe Telegraph & Trust, to-day, Tuesday. The Earl of Midleton, the chairman, explained the reasons for raising the dividend on the ordinary shares by 2 per cent., to 7½ per cent. net. He also referred, of course, to the conditions surrounding the present and future of Cable & Wireless. Globe ordinary shares at 15½ are the fraction to the good: Cable & Wireless ordinary is 3 points up at 48½, and the preference at 97 shows a smaller gain. Hopes of peace breaking out in Spain are partly responsible for these recoveries.

The Pump Primer

Reference has been made above to the continuance of the bullishness which started about a week ago in the American market. Mr. Roosevelt's stock, from being at a heavy discount, has bounded up to a high premium. His chances of being returned to the White House in the 1940 Presidential Election have suddenly soared to what the racing fraternity call "odds on." The prices of dollar stocks and shares are booming; by comparison, that is, with the depression that prevailed less than a month ago. The pump-priming President has already unloosed the floodgates of capital, pouring millions of dollars into previously arid areas of American industries. Whatever may be thought of the wisdom of such expedients, the fact remains that Americans have rushed to buy shares in their utility, metal and railroad undertakings. A rise this week of 10 points in American Telephone & Telegraph shares, to 141½, is amongst the more modest of the advances in this market.

No Power Projects Yet

Trade in the States is already declared to be responding to the injection of these many millions into the arteries of commerce, and, as already remarked, the effect of this revival is felt throughout a number of diversified directions in the London Stock Exchange markets. It may be added, incidentally, that no power plants or electrical distribution facilities have been approved yet to take a share in the 210 million dollars spending and lending programme.

"B. C. & H."

The issue of B. C. & H. Power Station three-and-a-half per cent. debenture stock, 1953-63, offered last week-end at 99, was oversubscribed. The subscription lists closed five minutes after they opened. Applications up to £5,000 stock were satisfied in full; over that amount 80 per cent. went to the subscribers. There is a premium of about 2s. 6d. over the issue price of 99. The contraction B. C. & H. means Bedfordshire, Cambridgeshire and Huntingdonshire; a clumsy title, obviously difficult to use in Stock Exchange dealings. For this reason the stock is going to be known in the market under the initials of the company. Vague rumours as to a possible new issue by the London Passenger Transport Board may have originated in the knowledge of the Board's recent expenditure upon new rolling-stock, &c. The rumours do not sound very probable.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Dividend. Last.	Price June 28.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	63/9	—	4 14 4
City of London	1	7½	7½	33/6	—	4 9 7
Clyde Valley	1	7	8	36/6	+6d.	4 7 8
County of London	1	10½	10½	48/6	—	4 6 7
Edmundson's 7% Pref.	1	7	7	32/-	—	4 7 6
Do. Ord.	1	8	9	38/6	+6d.	4 14 0
Elec. Dis. Yorkshire	1	9	9	42/6	—	4 4 9
Elec. Fin. and Securities	1	12½	12½	50/-	—	5 0 0
Elec. Supply Corporation	1	11	12	52/6	+⅛	4 11 5
Lancs Light and Power	1	7½	7½	32/-	—	4 13 9
Lond. Assoc. Electric	1	—	7	30/-	—	4 13 4
London Electric	1	8	7	35/6	—	3 19 0
London Power Deb. Red.	Stock	5	5	105½	—	4 14 9
Metropolitan	1	10	12	49/-	—	4 18 0
Midland Counties	1	7½	8	36/6	—	4 7 8
Mid. Elec. Power	1	8	9	2	—	4 10 0
North Eastern Electric Ordinary	1	7	7	32/-	—	4 7 6
Do. 7% Pref.	1	7	7	32/6	—	4 6 2
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	46/3	—	4 6 6
Do. do. 6% Pref.	1	6	6	29/6	—	4 1 4
Scottish Power	1	8	8	36/-	—	4 9 0
South London	1	7	7	32/-	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 6
Yorkshire Elec.	1	8	8	40/6	—	3 19 0
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	114	—	4 7 9
Do. 1955–75	,,	5	5	116	—	4 6 2
Do. 1951–73	,,	4½	4½	108	—	4 3 4
Do. 1963–93	,,	—	3½	99	+1	3 10 8
London Elec. Trans. Gtd.	,,	—	2½	92	−1	2 14 4
London & Home Counties, 1955–75	,,	4½	4½	112	—	4 0 4
London Passenger Transport, A	,,	—	4½	116½	+1	3 17 2
Do. do. B	,,	—	5	116½	—	4 5 10
Do. do. C	,,	4	4½	74½	+1	5 14 1
West Midlands Joint Elec. 1948–68	,,	—	5	112	—	4 9 3
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	141½	+10	6 7 3
Anglo-Am. Tel. Pref.	Stock	6	6	107	—	5 12 2
Do. Def.	,,	1½	1½	25	—	6 0 0
Cable & Wireless 5½% Pref.	,,	4½	5½	97	+1	5 13 7
Do. Ord.	,,	—	4	48½	+3	8 5 0
Do. Income	,,	—	—	100½	—	3 19 6
Globe Tel. & Tel. Ord.	10	5½*	7½*	15½	+½	4 18 4
Do. do. Pref.	10	6	6	13½	—	4 10 7
Great Northern Tel.	10	20	20	36xd.	+⅜	5 11 1
Marconi-Marine	1	10	7½	26/3	+⅛	5 14 3
Oriental Telephone Ord.	1	12*	12*	58/9	—	4 1 8
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	6/3	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	13	—	—
British Electric Traction Def. Ord.	,,	5	5	925	+25	—
Do. do. Pref. Ord.	,,	8	8	160	—	5 0 0
Brazil Traction	$100	70 cts.	$1	11½	+½	—
Brit. Columbia Elec. Rly. Pfd.	Stock	5	5	99	—	5 1 0
Mexican Light Common	$100	Nil	Nil	1	—	—
Do. do. 1st Bonds	$500	5	5	27½	+2½	—
Victoria Falls Ord.	1	20	12	65/-	+⅛	3 15 6
West Riding	1	6½	10	33/9	+⅛	—
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	1½	—	8 11 6
Assoc. Elec. Ord.	1	10	10	37/6	+1/6	5 6 8
Do. Pref.	1	8	8	36/6	—	4 7 6
Babcock & Wilcox	1	10	10	38/9	—	5 3 1
British Aluminium Ord.	1	10	12½	51/3	+2/3	4 17 6
British Insulated Ord.	Stock	20	20	4⅛	+½	4 10 1
Brush Ord.	,,	Nil	Nil	26½	—	—
Callenders'	1	20	20	4½	+⅛	4 9 0
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/-	12½	12½	27/6	+½	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	10	12½	32/6	—	7 13 10
Enfield Cable Ord.	1	25	25	2⅛	+⅛	—
English Electric	1	Nil	10	27/6	+1/-	7 5 6
Do. do. Pref.	1	6½	6½	25/6	—	5 2 0
Ericsson Tel.	5/-	25	25	38/9	+½	3 4 5
Ever Ready	5/-	45	35	18/6	−6d.	9 9 2
Ferranti Pref.	1	7	7	27/6	—	5 2 0
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	17½	20	75/6	+3/6	5 5 10
Henley's	5/-	15	20	20/-	—	5 0 0
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	10	12½	37/6	+⅛	6 13 4
Lancashire Dynamo	1	20	25	57/6	+½	8 13 8
Siemens Ord.	1	7½	7½	25/-	+⅛	6 0 0
Telegraph Construction	£1	7½	10	37/6	—	5 6 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1936

25974. "Electric remote-control systems for the change-speed and reversing-gear of power installations." J. H. Mathers. September 24th, 1936. (486106.)

29359. "Electrical measurement apparatus." Electrique Association Co-operative d'Ouvriers en Matérial Electrique. October 29th, 1935. (Cognate application 29360/36.) (486112.)

29445. "Electric motor control systems." English Electric Co., Ltd., and H. S. Carnegie. October 29th, 1936. (486114.)

29471. "Automatic electric circuit-breakers." S. Farrer, G. Pailin, and Ferguson, Pailin, Ltd. October 29th, 1936. (Cognate application 1292/37.) (486115.)

29478. "Snap-action electric switches." C. F. Burgess Laboratories, Inc. December 4th, 1935. (486116.)

32353. "Junction or conduit boxes for use in electrical wiring systems." W. J. Garratt and H. Garratt. November 26th, 1936. (486203.)

32743. "Means for protecting sheaths of electric cables, pipes and other metal articles against corrosion." W. T. Henley's Telegraph Works Co., Ltd., H. A. Tunstall and F. G. R. Jesson. November 30th, 1936. (486300.)

32934. "Electric-discharge devices for circuit control." British Thomson-Houston Co., Ltd., and H. De B. Knight. December 1st, 1936. (486307.)

32945. "Current control in a.c. circuits." D. Ashby and Westinghouse Brake & Signal Co., Ltd. December 1st, 1936. (486308.)

32974. "Cooling means for liquid-immersed apparatus, more particularly electrical transformers." R. Poole and Metropolitan-Vickers Electrical Co., Ltd. December 1st, 1936. (486435.)

32992. "Electrical apparatus." E. I. Du Pont de Nemours & Co. December 5th, 1935. (486501.)

32994. "Metallic vapour discharge lamps." P. Freedman and Crompton Parkinson, Ltd. December 1st, 1936. (486502.)

32995. "Electric discharge lamps." P. Freedman and Crompton Parkinson, Ltd. December 1st, 1936. (486503.)

33033. "Electron multipliers." Fernseh Akt. Ges. December 2nd, 1935. (486437.)

33077. "Electro-magnetic vibrating interrupters." Utah Radio Products Co. December 5th, 1935. (486504.)

33100. "Electric oscillation generators." Standard Telephones & Cables, Ltd., and B. B. Jacobsen. December 2nd, 1936. (486448.)

33125. "Inductance coils." Steatit-Magnesia Akt. Ges. December 2nd, 1935. (486122.)

33134. "Electric immersion heaters." Bulpitt & Sons, Ltd., and W. H. Bulpitt. December 3rd, 1936. (486450.)

33195. "Light-sensitive electron-discharge tubes." V. Zeitline, A. Zeitline and V. Kliatchko. May 5th, 1936. (486204.)

33372. "Electric-lamp fittings, especially bed-lamps." C. Kuhnel. December 5th, 1935. (486451.)

33392. "Electrically heated kettles, saucepans, and other vessels." J. Bate & Co., Ltd., and S. N. Fisher. December 5th, 1936. (486318.)

33511. "Low-pressure metallic-vapour convertor discharge tubes." S. N. Baruch. December 7th, 1936. (486320.)

35712. "Electrical bridge systems." H. W. Sullivan and W. H. F. Griffiths. December 30th, 1936. (486130.)

1937

136. "Control and protection equipment for sectionalised electric supply systems." A. E. K-O. Grimsdale and Metropolitan-Vickers Electrical Co., Ltd. January 2nd, 1937. (486323.)

159. "Emergency-stop switches applicable for use in electrically driven power installations." J. A. Crabtree & Co., Ltd., H. F. McLoughlin and B. G. Harrison. January 4th, 1937. (486456.)

324. "Manufacture of asbestos for electrical purposes." British Electrical & Allied Industries Research Association, H. L. D. Wyman and W. Lethersich. January 5th, 1937. (486213.)

334. "Control of direct-current electric motors." H. Newsam and Metropolitan-Vickers Electrical Co., Ltd. January 5th, 1937. (486457.)

622. "Electron cameras with photo-electric storage plates." Radioakt Akt. Ges. D. S. Loewe. January 11th, 1936. (Cognate application 623/37.) (486214.)

761. "Electro-magnetically operated indicators." A. Graham & Co., Ltd., and C. H. Vaughan. January 11th, 1937. (486326.)

979. "Electric power equipments for auxiliary apparatus for boilers." J. W. Young and F. A. Eastwood and Metropolitan-Vickers Electrical Co., Ltd. January 12th, 1937. (486134.)

1461. "Electric fuse elements." H. Lenk and E. Grunwald. January 18th, 1937. (486217.)

1594. "Electrodes for high-pressure metal vapour electric-discharge devices." General Electric Co., Ltd., and V. J. Francis. January 19th, 1937. (Cognate application 10027/37.) (486138.)

2042. "High-frequency transformers." E. K. Cole, Ltd., and G. Bradfield. January 23rd, 1937. (486140.)

2408. "X-ray apparatus." G. Grossman. January 27th, 1936. (Cognate applications 2409/37 and 2410/37.) (486460.)

3358. "Electrical systems of remote control." General Electric Co., Ltd., and J. E. Collyer. February 4th, 1937. (486142.)

3451. "Machine for automatically manufacturing electric conductors having air-space insulation and adapted for electrical communication." H. Yasouka. February 5th, 1937. (486143.)

3940. "Electric heating of articles or materials in a tunnel kiln." C. W. Thomas. February 10th, 1937. (486465.)

4280. "Cathode-ray oscillographs and like devices." Philco Radio & Television Corpn. February 25th, 1936. (486467.)

4447. "Electric switch contacts and mountings therefor." Siemens & General Electric Railway Signal Co., Ltd., and F. Horler. February 15th, 1937. (486148.)

5426. "Split-anode magnetrons." M-O Valve Co., Ltd., and E. C. S. Megaw. February 23rd, 1937. (486338.)

6046. "Electro-magnetic means for effecting impulsive rotary movement." W. S. F. Brown and F. B. M., Ltd. March 1st, 1937. (486231)

7439. "Electric lamps." Tungstalite, Ltd., and B. Wechsler. March 13, 1937. (486234.)

8201. "Carrier-wave modulating systems and apparatus." Standard Telephones and Cables, Ltd. May 5th, 1936. (486473.)

9293. "Electric-discharge devices adapted to generate short-wave oscillations." M-O Valve Co., Ltd., and E. C. S. Megaw. April 1st, 1937. (486244.)

9671. "Electric measuring devices with automatic thermo-electric amplifiers." Siemens and Halske Akt. Ges. April 3rd, 1936. (Cognate application 9672/37.) (486247.)

10516. "Electric valve converting apparatus." British Thomson-Houston Co., Ltd. April 15th, 1936. (486349.)

11438. "Pupin coil junction sleeves for submarine cables." Felten and Guilleaume Carlswerke Akt. Ges. April 22nd, 1936. (486166.)

11470. "Electric light fittings." L. T. Dixon. April 22nd, 1937. (486350.)

14735. "Electric light fittings for vehicles." Briggs Manufacturing Co. May 28th, 1936. (486258.)

15739. "Ignition devices for electric-discharge devices." British Thomson-Houston Co., Ltd. June 6th, 1936. (486356.)

15925. "Thermionic valve push-pull modulators." Allgemeine Elektricitäts-Ges. June 8th, 1936. (486358.)

17938. "Insulators for use in electric overhead trolley wire systems." L. C. Spencer. June 26th, 1936. (486262.)

18011. "Systems for the remote-control of railway track switches and signals." General Railway Signal Co. July 18th, 1936. (486361.)

18700. "Manufacture of coated welding electrodes." A. Arc, Ltd. July 4th, 1936. (486365.)

18950. "Current-responsive electrical instruments." British Thomson-Houston Co., Ltd. July 8th, 1936. (486486.)

20060. "Improving the electrical resistance of animal fibres." R. J. Tugwood (Dominion Silk Mills, Ltd.). July 20th, 1937. (486369.)

20147. "Manufacture of coaxial conductor electric cables." Standard Telephones and Cables, Ltd. January 7th, 1937. (486370.)

21191. "Automatic volume control devices for wave transmission systems." Standard Telephones and Cables, Ltd. September 19th, 1936. (486372.)

21637. "Incandescent screens for cathode-ray tubes." Farnsworth, Television, Inc. August 18th, 1936. (486373.)

22182. "Electric gas-lighters." Telefonaktiebolaget L. M. Ericssen. August 22nd, 1936. (486269.)

23708. "Television and other picture transmitters." Marconi's Wireless Telegraph Co., Ltd. August 29th, 1936. (486377.)

26144. "Terminals for electric condensers." Mallory Patents Holding Co., Ltd. September 29th, 1936. (486384.)

27573. "Voltage regulators for electric circuits." F. Spalti-Muller. October 11th, 1937. (486386.)

28779. "Electric resistance heating-apparatus." E. Challett and Entreprises Electriques Fribourgeoises. January 13th, 1937. (486391.)

29066. "Holder for magnets of high coercive force." Landis and Gyr Akt. Ges. November 10th, 1936. (486393.)

29223. "High-pressure metallic-vapour electric-discharge lamps." Vereinigte Gluhlampen und Elektrizitäts Akt. Ges. October 26th, 1936. (486394.)

29424. "Electric immersion-heaters." Bulpitt and Sons, Ltd., and W. H. Bulpitt. December 3rd, 1936. (Divided out of 486450.) (486493)

29709. "Electric tumbler switches." G. E. Marr. October 30th, 1937. (486285.)

30721. "Sockets of electric lamps having elongated envelopes and lateral caps." General Electric Co., Ltd. March 12th, 1937. (486399.)

32001. "Circuit arrangements for coupling electric generators to loads." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 23rd, 1936. (486286.)

33152. "Screened electrical ignition installations." R. Bosch Akt. Ges. December 1st, 1936. (486193.)

34465. "Electric meters of the induction type." Siemens-Schuckertwerke Akt. Ges. February 16th, 1937. (486406.)

1938

5130. "Means for producing light comprising in combinations an electric-discharge lamp and an electric incandescent lamp whose filament is in series with the discharge path." British Thomson-Houston Co., Ltd., and General Electric Co., Ltd. February 20th, 1937. (486418.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 29th:—

Rotaceptor. No. 585466, Class 6. Electromotors and electric transformers, being machines.—Technical Inventions, Ltd., Terminal House, Grosvenor Gardens, Westminster, S.W.1.

Heliowatt (lettering and design). No. 583152. Class 8. Instruments and apparatus for use in wireless telegraphy and telephony, electricity meters, electrically operated measuring apparatus, automatic time-switching apparatus and apparatus for controlling power in electric circuits by means of electric relays.—Heliowatt-werke Gesellschaft, Charlottenburg, Germany (British representatives, G. F. Redfern & Co., 15, South Street, E.C.2.)

Hanovia (lettering and design). Nos. 584416, 584417 and 585382. All goods in Classes 8, 11 and 18.—Hanovia, Ltd., Bath Road, Cippenham, Slough, Bucks.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Addington.—Houses (31), Annesley Drive; Bennett & Worskett. Flats (32), Wickham Road; Burcote, Ltd. Eleven shops and flats, Lodge Lane; Murrell & Piggott.

Alloa.—Cinema, Mill Street (£30,000); V. Cuthbert, solicitor, Alloa (agent).

Armadale.—Houses (60), Lower Bothville; burgh surveyor.

Ayrshire.—Reconstruction, Grange school, Kilmarnock (£21,000), for the E.C.; county architect, Ayr.

Birkenhead.—Dock hotel, at the junction of Stanley Road and Tyrer Street, for D. Higson, Ltd.

Birmingham.—Market, Edgbaston Street (£127,000), and treatment centre, Erdington (£8,147); city engineer. School; R.C. Authorities. Rebuilding Rubery school (£90,000) and school, Brearley Street (£13,000), for the E.C. Rebuilding offices, Corporation Street (£90,000); Birmingham Gazette, Ltd.

Bishop's Stortford.—Houses (72), Hallingbury Road estate; U.D.C. surveyor.

Blaydon-on-Tyne.—Swimming baths, gymnasium, sports arena, &c.; T. Mills, surveyor.

Bolton.—Three schools; R.C. trustees.

Bournemouth.—Houses (19), Petersfield Road; J. N. Hardy. Schools, East Howe and Hill View Road (£14,614); A. S. Prince & Co. Technical college, Meyrick Road (£110,000), for the E.C.

Brentford.—Factory, Thames Road, for R. & J. Parks, Ltd.; J. Miles & Sons, architects, Bexley.

Bridgend.—Ordnance factory, for War Office; Gee, Walker & Slater, Ltd., contractors, Fitzmaurice Place, London, W.1.

Brighton.—Houses (17), St. John's Place; D. A. Hopper. Shops and flats, Marine Drive, Rottingdean; J. Turner.

Brownhills.—Municipal buildings (£15,000); U.D.C. surveyor.

Burnley.—School (£42,418), for the E.C.

Caistor (LINCOLNSHIRE).—Houses (30); R.D.C. surveyor.

Carnoustie.—Houses (28), Wilson's Park, Kinloch Street, with electrical work, for T.C.; Bruce, Son & Morton, architects, 10, Whitehall Street, Dundee.

Caterham.—Extensions to asylum (£9,366); William F. Blay, Ltd.

Chorley.—Houses (92), Brown Street site; borough surveyor.

Colchester.—Fever block and additions and alterations of Shaw Block, Infectious Diseases Hospital, Mile End; H. Collins, borough engineer.

Coventry.—Enlargement of Foxford school (£21,923), for the City Council. Extensions to works, near Daimler Road, for Daimler Co., Ltd.; Higgs & Hill, Ltd., contractors, Crown works, South Lambeth Road, London, S.W.8.

Crosby.—Houses (40), Sandy Road scheme; J. R. Fothergill, borough surveyor.

Croydon.—Houses (14), Ash Tree Way; W. & H. West, Ltd. Houses (12), Tower View; West's Houses, Ltd. Flats (86), Birchanger Road; E. Handley. Extensions to Benson school (£14,800), for the E.C.

Dartford.—Houses (30), Ashen Drive; Ashleigh Estates, Ltd. Houses (18), Heather Drive; Classic Homes, Ltd.

Devizes.—Cinema, Monday Market Street; A. A. Pilkington.

Dewsbury.—Shops and offices, Market Place, for Prudential Assurance Co., Ltd.; J. Williams, Ltd., builders, Collingwood Street, Liverpool.

Doncaster.—Stores, Baxtergate (£100,000), for F. W. Woolworth & Co., Ltd.; building dept., New Bond Street, London, W.1.

Ealing.—Houses (85), Edward Avenue; T. F. Nash Construction Co., Ltd., Uxbridge Road, Hayes.

Edinburgh.—National library (£250,000); R. Fairlie, architect, Edinburgh.

Eire.—(BUSH, Co. LOUTH).—School, Bush, for the County Louth Vocational E.C., Dundalk; T. P. McGahon, architect, Exchange Buildings, Dundalk. (DUBLIN).—Houses, Emmet Road, for the Dublin Corporation; H. G. Simms, housing architect, 3, Parliament Street.

Falkirk.—Extension to factory, for Grahamston Iron Co., Ltd.

Glamorganshire.—Operating theatre, &c., Penrhiwtyn Hospital, Neath; county architect, County Hall, Cardiff.

Glasgow.—Children's hospital, Stobhill (£100,000), nurses' home, Southern Hospital (£20,000), and police riding school, Greendyke Street (£12,000); city engineer.

Greenford (MIDDLESEX).—Shops and flats, Medway Parade; Medway Estates, Ltd.

Hamilton.—Houses (892), Fairhill; burgh surveyor.

Houghton-le-Spring.—Houses, three-acre site; U.D.C. surveyor.

Ince-in-Makerfield.—Houses (140), near Pennington Lane, Ince; A. F. Howgate, clerk to U.D.C., Council Offices, Ince.

Jarrow.—Cinema, York Avenue; W. B. Pearson, Grange Road.

Kettering.—Houses (100), Avondale estate, for U.D.C.

Kidderminster.—Development of Cairndhu estate; Taylor & Taylor.

Leicester.—Houses (150) and shops, Braunstone estate and Northfield House estate, for Housing Committee; housing architect, 18, Highcross Street.

Lerwick.—Gilbert Bain Memorial hospital (£50,000); J. Miller, architect, Blytheswood Square, Glasgow.

Lincoln.—Houses (152), Monks Tower estate; city engineer.

Liverpool.—Houses, Smithdown Lane, Harding Street and Aigburth Street; city engineer. Cinema, Liverpool Road, for T. W. Roberts; L. Prichard, architect, 34, Moorfields.

London.—(BETHNAL GREEN).—Houses, Turin Street; L.C.C. architect. (CAMBERWELL).—Houses, Neate Street; L.C.C. architect. (CHELSEA).—Tenements, Riley Street; L.C.C. architect. (DULWICH).—Rebuilding of Heber Road school (£32,950); L.C.C. architect. (HACKNEY).—Tenements, King's Mead estate; Gee, Walker & Slater, Ltd. (LEWISHAM).—Stores, Myron Place; Royal Arsenal Co-operative Society, Ltd. (PLUMSTEAD).—Enlargement of St. Nicholas Hospital (£108,400); Halse & Sons, Ltd., 5, Chapel Street, S.E.18. (ST. PANCRAS).—Relief station, clinic and offices, Chalton Street (£26,145); L.C.C. architect. (SOUTHWARK).—Dwellings, Rockingham estate; Stewart & Partners, Ltd., 105, Baker Street, W.1. Rebuilding of Penrose school (£34,990); L.C.C. architect, County Hall, Westminster Bridge Road, S.E.1. (WANDSWORTH).—Tenements, Wandsworth Plain; borough engineer. (WESTMINSTER).—Shops, Lansdowne Row; Mayfair Hotel Co., Ltd., Berkeley Street, W.1.

Market Harborough.—Cinema, for Union Cinemas, Ltd.; H. Martin, Ltd., contractors, Renford Street, Northampton.

Merstham.—Houses (1,500), new estate, for Merstham Tenants, Ltd., 802, Finchley Road, London, N.W.11.

Middlesbrough.—Houses (19), Farndale Road; H. C. Garbutt, architect, 18, Albert Road. Houses (56), Tollesby Road; N. Thompson, builder, Stonehouse Street. Houses (12), Winchester Road; Briggs and Hughes, builders, 42, Phillida Terrace. School, Prissick Farm estate, for the E.C.; education architect, Woodlands Road.

Mirfield.—Maternity ward, for the Board of Management of Mirfield Memorial Hospital; Firth, Son & Blackburn, architects, 22, Wellington Road, Dewsbury.

Morpeth.—Houses (68), Lynemouth estate; R.D.C. surveyor.

Nantwich.—Houses (174), various sites; R.D.C. surveyor.

Newcastle Emlyn.—Houses (150); R.D.C. surveyor.

Newcastle-on-Tyne.—Three community centres; R. G. Roberts, 18, Cloth Market. Extensions to Princess Mary Maternity Hospital, Jubilee Street; Cackett, Burns, Dick & McKellar, architects, 21, Ellison Place. Reconstruction of Fenham Barracks for the War Office (£50,000); Anglo-Scottish Construction Co., builders, Palace Street, London, S.W.1.

Nuneaton.—Cubicle block, Bramcote Isolation Hospital; borough surveyor.

Ossett.—School, for the E.C.; C. Kendall, architect, Bank Street.

Paignton.—Houses (48), Southview Road; T. & L. Roper Bros.

Ramsbottom.—Houses (38), Stubbins Lane, &c.; U.D.C. surveyor.

Reading.—Central fire station, with nine firemen's houses; borough surveyor.

Renfrewshire.—Houses (126), Clarkston; Lawrence Building Co., Ltd., Glasgow.

Rhoose.—Extensions to factory for Aberthaw and Bristol Channel Portland Cement Co., Ltd.

Rugby.—Cinema, Hillmorton Road, for Scala Theatre Syndicate, Ltd., Northampton.

Sedgley.—Houses (78), Beacon estate; Nathan Hyde.

Slough.—Houses (300), Baylis Court estate; U.D.C. surveyor.

Staffordshire.—School, Uttoxeter (£25,025), for the County E.C.

Sturry (CANTERBURY).—Houses (340), Stonerock; Nunn's Estates, Ltd., Stanley Park Road, Wallington.

Swanscombe.—Houses, Knockholt site; J. B. Lingham & Stark.

Taunton.—Houses (166), Halcon & Lyngford estates, for T.C.; J. Standerwick & Sons, builders, Taunton Road.

Troon.—Houses (221), Muirhead; burgh surveyor.

Washington (Co. DURHAM).—Extensions and alterations to the Regal Cinema; D. Glen, contractor, Back Queen's Road, Jarrow-on-Tyne.

Wellingborough.—Houses (214), Croyland Road site; U.D.C. surveyor.

Welwyn.—Cinema, London Road, for Pavilion Cinemas (Whitehall), Ltd.

West Hartlepool.—School, Dyke House estate; borough engineer.

Wigtown.—Houses (40), Jail Field site, for T.C.; A. Young, architect, Newton Stewart.

Wolverhampton.—Business premises, Darlington Street (£40,000), for J. Beattie, Ltd.; Wilson, Lovatt & Sons, Ltd., builders, Clarence Street.

A Welded Steel Building

A new fourteen-storey apartment building in Eighth Avenue and Twentieth Street is the first to be constructed in New York under the revised code which this year made the use of welding in building construction permissible for the first time, states *Reuter's Trade Service* from New York. Six petrol-driven generators (four Wilson 300-A, one Lincoln 300-A, and one Electric Arc Cutting & Welding Co.'s 200-A) were used. They were installed on the ground floor and leads were run up to the various floors as the work progressed. What has most impressed people in New York has been the complete silence of the new construction method.

Change of Address

The Iron and Steel Institute and the Institute of Metals have moved to 4, Grosvenor Gardens, London, S.W.1. The telephone number and telegraphic address of the former are respectively Sloane 0061 and "Irosamente, Sowest, London," while those of the latter are Sloane 6233 and "Sloane 6233, London."